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MEMOIRS

OF THE

PHILADELPHIA SOCIETY

FOR PROMOTING AGRICULTURE.

CONTAINING

COMMUNICATIONS ON VARIOUS SUBJECTS

IN

HUSBANDRY & RURAL AFFAIRS.

TO WHICH IS ADDED,

AT THE REQUEST OF THE SOCIETY,

"AGRICULTURAL INQUIRIES ON PLAISTER OF PARIS."

VOL. II.

"Let us cultivate the ground, that the poor, as well as the rich, may be filled; and happiness "and peace be established throughout our borders."

Tentanda Via est, qua nos quoque possimus tollere Humo;——

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1811.

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"taining Communications on various Subjects in Husbandry and Rural Af-
"fairs. To which is added at the request of the Society, Agricultural In-
"quiries on Plaister of Paris, Vol. II.

"Let us cultivate the ground, that the poor, as well as the rich, may be
"filled; and happiness and peace be established throughout our borders."

"Tentanda via est, qua nos quoque possimus tollere Humo:

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D. CALDWELL,

Clerk of the District of Pennsylvania.

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PREFACE.

AT length we have completed another volume, which will be a proof of our perseverance; with whatever other consequences it may be attended. In it will be found many useful pieces of information, though *novelty* may not attract the merely curious inquirer. To practical men, the developement of old operations, tested by experience, are more important, than new discoveries: yet some of even these will be seen. Nothing injures agriculture more than whimsical novelties; except bigotted adherence to old and bad habits. It should be the aim of all agricultural publications, to record and promulgate good practices; and to extinguish, by practical and well ascertained facts, the mischiefs, or insufficiency, of old and inveterately bad customs. New discoveries seldom occur: but when they are known, they should be examined with care, and received with caution; but without prejudice. When tested by experience, they should be added to the store of profitable lessons; and explained and enforced by intelligence and industry. AGRICULTURE, like the *Common Law*, is more indebted, for its best principles, to precedents founded on wisdom and experience, than it is to the presumed improvements of theorists, and speculative experimenters. This is enough for us to concede, to those who receive every thing *written* with distrust and hesitation; and suppose that none are acquainted with husbandry, but those who hold the handles of the plough. To those who began with theories, originating in ingenious and speculative opinions, philosophy, and the arts and sciences, are highly indebted for some of their best principles. Pursuits with the fatu-

3766.

ous view to the discovery of the philosopher's stone, or other dreams of alchymists to achieve the transmutation of metals, have originated some of the most important facts, now known and practised upon. No small portion of agricultural improvement now flourishes under the discoveries of men, deemed, by prejudice, equally wild and visionary. This should therefore warn practical farmers against the ruinous foes to their own prosperity,—the incredulity and prejudice with which they receive (if they take the trouble to read them) *written communications:* and those more especially, which contain chemical and philosophical principles, applied to the art of practical husbandry; from which agriculture derives most essential advantages.

Having, with the most affectionate attachment, addressed ourselves to practical farmers; we take the liberty, most respectfully, to say a few words, to those of our fellow-citizens who are not immediately employed in husbandry; while they prosper on the produce of the toils and anxieties of husbandmen. They celebrate and enjoy in their feasts, with great ardour and approbation, the blessings of AGRICULTURE; and place it in alphabetical order, as it is in fact, as the first of arts. But here ends their zeal. Not through defect of patriotism, but through want of conviction, that more than their good wishes are required. Yet agriculturists are thankful for this testimony in their praise; and gratified by the libations plenteously poured out in honour of their art. While COMMERCE, which is but its hand-maid, receives highly profitable, though not always sufficient, attentions, (and so it ought, as its interests and those of husbandry are indissolubly united) AGRICULTURE, its foundation, is left to find its own auxiliaries and security; and must, unassisted, take its chance for progress and prosperity. Legislative attention is scantily afforded; and private aid is little seen, or felt. If a few zealous individuals step forward, to stimulate and advance its interests, they are left to consume their zeal by its own efforts. These are slow in their

operations, and not promptly influential in their effects. Individuals are thus discouraged from forming associations, for agricultural purposes. We believe there are few of the kind, in activity, to the southward of Pennsylvania. We deplore this state of things, not as it respects ourselves; for *we* presume on no claims to peculiar support or attention; nor have we the vanity to identify ourselves with the *subject* of our institution. The observations are general, and too well founded. We, 'tis true, have made an effort, hitherto ineffectual, to increase our numbers and our funds. Although it has not had its effect, we trust that, when understood and more generally known, it will yet be successful. The plan is in the volume, and submitted to our fellow citizens, for their consideration.

It will be seen that our correspondents, however personally respectable, are not extensively increased. This has forced on some of our members, the necessity of repeated efforts, to add to our stock of information. They, most willingly, would have given place to others, had they came forward to afford their assistance. We mention not these circumstances in a style of complaint; but as facts, in support of our assertions; and with the hope, that more desirable prospects will soon open, to gratify our wishes.

We shall patiently wait for convictions of its importance, and essential use to all their prosperity, to impress the subject of our endeavours on the minds of our fellow citizens. If our efforts produce no immediate effects; we shall be content, that, with the best intentions, we "cast our bread upon the waters" to be "found," by those for whose service we disinterestedly exert ourselves, "after many days."

We, however, flatter ourselves, that our humble efforts have not been entirely vain and unproductive. On the contrary, we are persuaded, that important benefits have accrued. But the extent of them cannot be otherwise than limited, and not generally influential; while they flow from the endeavours

of a few. We are abundantly happy to perceive, every where, agricultural improvement; growing even under the praise-worthy skill and labours of unconnected individuals; not enjoying the advantages, which a knowledge of the success of others, in approved practices, would impart. Yet, unless a general spirit of systematical improvement can be roused, the progress must be slow. We see the extent of the ground; but feel ourselves inadequate to the occupation of it. When speculation, and a thirst for instant gain, find objects of employment tending to immediate profit, real or fanciful, ardour in the pursuit is rapid and active. But when results are produced by combinations not strikingly apparent, we are not disappointed when we find, that much time and pains are required, to produce general attention, and salutary conviction.

It is vain to say, that agriculture is sufficiently encouraged, by those who take off and consume, or deal in, its products. This may be said of any other branch of labour, art, employment, or pursuit. It has been found, in all ages and countries, that the *cultivators of the soil* require peculiar attention to instruction in their own art. Genius, learning, patriotism, wealth and power, have been, from the remotest times, employed in their encouragement. This encouragement has ever been deemed the most honourable, and the brightest ornament, to the characters of those who bestowed it.

The wise and good LEADER of the patriots of his day, who was an instrument, in the hands of heaven and his country, to lay the foundations of our present prosperity (unexampled in other regions of our globe, though deplorable and vexatious casualities, unjust and oppressive trespasses, and mortifying interruptions, too often lop its *exuberances*) was, in addition to his other virtues, distinguished for his ardent devotion to the interests of AGRICULTURE; and delighted in its practical pursuits. He has erected for himself, a MONUMENT to his fame, in the happiness of his country.

Every field, smiling under the toils and economy of the husbandman,—every sail wafting the treasures of commerce,—every fabric raised by wealth and taste, for comfort and convenience,—or splendor and enjoyment,—all the blessings which religious or civil institutions shed around them,—all the products of the useful, or elegant, arts,—and,—the cement and security of the whole,—the freedom and independence of our country,—are the rich and invaluable materials, of which this monument is composed;—and AGRICULTURE IS ITS BASE.

This capacious monumental pyramid,—thus splendidly ornamented,—visible to all the civilized world,—limited in its site, only by the territorial boundaries of our nation,—has, inimitably, anticipated the faltering chissel of the tardy sculptor. Unless the desolating volcano of DISCORD, should whelm his and our beloved country, in its exterminating lava, it will, through ages yet to come, defy the tooth, and the ravages, of time.

FAME, long the faithful eulogist of the atchievements of our departed MILITARY CHIEF, and those of the brave and patriotic band,—his companions in arms,—now intermits its clangors, or lays aside, her justly boastful and far-sounding trump. She attires herself in the peaceful garb, and is decked with the emblems, of CERES. Admiring this stupendous memorial of the CIVIC VIRTUES of the father of his country, and his venerated compatriots, she displays them for imitation. She hovers o'er its pinnacle, or visits its apartments; and encourages, by recitals of WASHINGTON'S precepts and example, our own citizens, in the ways of well-doing. She invites,—not the ambitious, the visionary, or the restless and disappointed; but the worthy and ingenious, of all descriptions and countries;—and peculiarly the industrious and sober husbandman and artizan,—from the troubles and oppressions which afflict them, in the desolated and subjugated portions of *Europe*. She allures, without anxious or un-

dignified solicitation, yet with sympathy and welcome, the heavy laden, to lay down their burthens; and here take,—not indolent rest, but,—active, profitable, and useful employment. To this she entices, urges, and animates, by displaying the benefits derived from it, to all engaged in the culture of our fields; as well as to those who subsist and prosper on the fruits of the husbandman's toils. She awakens their attention, and rouses their emulation and exertion, by casting enlivening rays, from the uplifted TORCH OF CERES, on the exuberant HORN OF PLENTY;—continually diffusing its blessings, and therefore constantly requiring to be replenished and supplied.

PUBLIC GRATITUDE, hitherto lingering and dilatory, may, even thus late, rouse the GOVERNMENT of our nation;—grown great and prosperous, on the fruits of the virtues and labours of our admired and lamented HERO and PATRIOT. The effusions of PATRIOTISM may yet rescue our country, from the stain of unpardonable and impolitic neglect, by animating PRIVATE CITIZENS to raise to his memory, a MONUMENT, honourable to them; though (however highly decorated) less brilliant than that *He* had founded, for his country and himself. Should this desirable event occur,—let the fact be recorded, on the most conspicuous of its tablets,—that "THE ENCOURAGEMENT OF AGRICULTURAL IMPROVEMENT, AND INFORMATION, WAS AMONG THE FAVOURITE WISHES OF HIS HEART."

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L. K. Shoemaker

AN ACT,

TO INCORPORATE THE

PHILADELPHIA SOCIETY,

FOR PROMOTING AGRICULTURE.

WHEREAS a number of persons desirous of promoting agriculture in this country, have for that purpose associated themselves in the city of Philadelphia, and it is the manifest interest of free governments to cherish and encourage institutions of such a nature: Therefore,

Sect. I. *Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by authority of the same,* That the persons who now constitute the Philadelphia society, for promoting agriculture, or who shall hereafter be admitted members of the same, shall be, and hereby are declared to be a body politic and corporate for the term of ten years, from and after the passing of this act, by the name and style of, "The Philadelphia Society for promoting Agriculture," to have succession, to plead and be impleaded, sue and be sued, in all courts of record or elsewhere, and be capable to take, hold and enjoy lands, tenements and hereditaments, goods and chattels, and the same from time to time to sell, grant, demise alien and dispose of, to use a common seal, and to alter or renew the same at pleasure: *provided* that the clear yearly value of the real estate by them held shall at no time exceed the sum of three thousand dollars.

Sect. II. *And be it further enacted by the authority aforesaid*, That the officers of the said corporation shall consist of a president, vice president, treasurer, secretary, and such other officers as the said corporation may think necessary, who shall be elected annually or otherwise as the rules and by laws of the corporation may direct.

Sect. III. *And be it further enacted by the authority aforesaid*, That the said corporation when convened, upon due notice given to the members by public advertisement or otherwise, shall have power and authority to make ordain and establish such, and so many rules, by-laws and ordinances relating to the times of meeting, the admission of members the powers and duties of the officers thereof, and the ordering of the other concerns of the said corporation, as they may deem necessary and proper: *provided*, That no rule, by-law or ordinance as aforesaid, shall be valid if inconsistent with the constitution and laws of this state or of the United States.

Sect. IV. *And be it further enacted by the authority aforesaid*, That the present officers of the said society shall continue in their respective stations until an election shall be made under this act, and the rules by-laws and ordinances now in force, not inconsistent with the constitution and laws of this state, or of the United States, shall be good and valid until altered amended or abrogated by the corporation.

JAMES ENGLE,
Speaker of the House of Representatives.

P. C. LANE,
Speaker of the Senate.

Approved—the fourteenth day of February, one thousand eight hundred and nine:

SIMON SNYDER.

At the Annual Meeting January 1810, *the* 10*th Law of the Society, was altered as follows.*—

ARTICLE X.

THE members of the society shall be distinguished into *resident, honorary and contributing members.*

Resident members shall consist of persons residing within a convenient distance, to attend the meetings of the Society at Philadelphia; and these are defined to be such, only as at the time of election, reside within ten miles of the said city, on either side of the Delaware. All members of agricultural societies, in other states and countries, with whom we shall correspond; and all persons of this state, and of other states and countries, who shall be elected by us for the purpose, shall be *honorary members;* and are hereby invited to assist at our meetings, whenever they come to Philadelphia. Strangers who desire to be present, as auditors, may be introduced by a resident member.

Honorary contributing members are of the description hereafter mentioned.

Every citizen contributing, and paying into the hands of the treasurer, a sum not less than FIFTY DOLLARS, may be elected, agreeably to the rules, an *honorary member;* without regard to place of residence. Those who thus laudably enable us to extend the usefulness of the society, and promote its objects, are invited to assist at our meetings. They will be styled *honorary contributing members.*

All donations and bequests for general purposes, shall be faithfully used; and regular accounts kept of their application.

Such donations or bequests as are given, granted, made or devised, on terms directing their being used in, or applied to, any particular branch or branches of husbandry, or rural œconomy; or subjects connected therewith, shall, with all due fidelity, be so used or applied. And if they, or any of them, shall not be, at the time, sufficient to accomplish the object designated, in whole or in part, they and every of them, shall be placed in a situation, if practicable, to accumulate; until by additions of other means, the object intended can be effectuated.

The names, and amount and description of donations, of all citizens contributing pecuniary or other donations, of any amount or description whatever, shall be registered, in a roll kept for that special purpose. They will merit and receive the thanks of the society, for the patriotism and public spirit, evinced by their thus affording the means of accomplishing the objects of our institution.

OFFICERS OF THE SOCIETY FOR 1811.

PRESIDENT—RICHARD PETERS.
VICE PRESIDENT—GEORGE CLYMER.
TREASURER—SAMUEL HODGDON.
SECRETARY—JAMES MEASE M. D.

COMMITTEE OF CORRESPONDENCE.

RICHARD PETERS.
GEORGE CLYMER.
JAMES MEASE M. D.
JOSEPH CLOUD.
JOHN VAUGHAN.

Members elected since the publication of the first volume.

Resident.

Abraham M'Garrigues, Philadelphia.
Reuben Haines, ditto
William Esher, ditto
George Esher, ditto
Theophilus Harris, ditto
Charles Lewis, ditto
John Lorain, ditto
Monsieur De Lormerie, ditto
J. B. M'Kean, ditto
P. M'Kell, ditto
George Kinnard, ditto
Elliston Perot, ditto
Charles Wister, ditto
David Caldwell, ditto
James Cutbush, chemist and apothecary, ditto

Honorary Members.

Daniel Buckley, Lancaster County Pennsylvania.
Samuel D. Ingham, Bucks County, ditto
A. M'Calister, near Harrisburg, ditto
John Morrison, Jenkin town, ditto
David Moore, Chester County, ditto
Samuel West Chester County, ditto
Benjamin Hobhouse, President of Bath and west of England agricultural society.
Robert Barclay, of Berry Hill, Essex England.
Benjamin Waddington, Bath, ditto
John Cox. Burlington. County, N. Jersey.
John Nicholas Van Eys, Amsterdam.
John Armstrong, late minister of U. S. to France.
Monsieur de Cubieres near Paris.
Daniel Parker, ditto
Andrew F. Michaux, Paris.
Monsieur Thouin, Professor of Agriculture, national Museum Paris.
Benjamin Ives Gillman, Marietta, Ohio.
Monsieur Sylvester, Secretary to Agricultural Society, Paris.

The following Members were omitted in vol. 1st, among those elected previously to 1805.

Dr. Benjamin S. Barton, Professor of Natural History, Materia Medica and Botany, in the University of Pennsylvania.
* Mr. Samuel Vaughan, of Jamaica.
* Mr. Charles Vaughan, ditto.

The following were omitted among the members elected since the publication of the last volume.

C. N. Buck, Philadelphia.
Ralph Eddowes, ditto.
* Edward Duffield, Lower Dublin, Philadelphia county,
* Thomas Moore, Montgomery county Maryland,

At the last annual meeting of the Agricultural Society, February 1810, a gold medal, value FIFTY DOLLARS, was unanimously voted to John Taylor Esq. of Caroline county, Virginia; for his great exertions in raising LIVE HEDGES; of which an account is given in the first volume of the Society's Memoirs.

The following was published, with the foregoing Alteration of the 10th Law of the Society.

Address of the Society to their Fellow Citizens.

THE Philadelphia Society for promoting Agriculture have now nearly completed six years, since their revival from a state of inactivity into which they had fallen. The causes, which produced their former torpor, are not entirely removed. A zeal for the objects of their association, among the inhabitants of this opulent, commercial, and manufacturing city, has not appeared in the extent expected. There exists among the citizens a mistaken opinion, that it is necessary for every member of our society to be an agriculturalist, either in practice or theory. Moderate contribution of either money or time, and patronage afforded to the means of encreasing agricultural knowledge and practice, are the primary requisites. These are within the power of most citizens, whatever may be their occupations. The citizens of Philadelphia, are exceeded by those of no other part of the United States, in talents and capacity to promote the prosperity of their country by encouragements to agriculture;—the foundation upon which the public happiness, comforts and support are erected. There is no part of the United States, in which such talents and capacity, can be more effectually and beneficially employed, for the mutual prosperity of both city and country. We have neither the presumption nor the inclination to assume the office of censors; nor do we deem ourselves entitled to lead the public opinion; nor to mention any thing in a style, either of complaint or solicitation. Our association is voluntary, our pursuits neither interested nor selfish, and our efforts zealous, but, from necessity, limited and inadequate. More efficient talents, and greater numbers

of active members, must be added, before our objects can be attained. An increase of funds is also indispensable. We take the liberty of enumerating, briefly, some of the objects at which we aim; and we have published the act of incorporation, which the Legislature have been pleased to grant to us; that those who desire to give their assistance, through us, to the all important subject of our association, may judge for themselves. They will perceive, that we are now in a legal capacity to receive donations, and to hold and secure property, for the purposes of our institution. The design, and means of accomplishing it, may be seen in the first volume of our memoirs; the publication whereof has made no small deduction from our scanty funds.

1. We wish to receive and promulgate agricultural information and intelligence both theoretical and practical; preferring always the latter. In this object we have received very flattering encouragement; both in our own country, and by the attentions of Societies and Individuals of other Countries.

2. We have proposed *Premiums* to stimulate and encourage our agricultural fellow citizens, in that laudable emulation, which gives vigour and effect to the efforts of individuals in every branch of agriculture, and the arts and manufactures of which it is the source.

3. We desire to promote the establishment of a manufactory of agricultural implements, and of every instrument, and utensil required in operations connected with the practice of any, and every, branch of husbandry. Also, as part of this establishment, a Ware Room for the exhibition and sale, when approved and stamped under proper regulations, of all such implements, instruments and utensils. And also for exposing to view, models and drafts, plans and projects for improvements in husbandry and rural œconomy.

4. A *Pattern Farm*, on which every experiment in husbandry may be made, and approved practice introduced.

Every probable theory may be herein brought to a practical test; its uses shewn, or its fallacy detected. This would become a school for disseminating agricultural knowledge; by means far more influential and instructive, than any heretofore devised.

5. A Veterinary Institution, for investigations into the diseases of Horses, Cattle, Sheep and Swine; and preventives and remedies; as the means to gain and promulgate the knowledge of both diseases and cures. Of such, especially, as are common, or peculiar to our climate and country.

6. To promote the formation of similar societies through the state: and (if required) to co-operate with them in every endeavour, to forward the objects of our own and their establishments.

Some of these views may be, and now certainly are, in the extent contemplated, beyond our present powers and pecuniary means. But we must be satisfied with having attempted the beginning of a plan, which may hereafter be accomplished, however distant the period of success, may now appear. That period may be wonderfully accelerated by the aid and exertion, our fellow citizens have it in their power amply to afford. We indulge an ardent hope, that the importance of a subject, in which we all are deeply interested, will be more generally seen, and more highly appreciated.

RICHARD PETERS, *President.*

JAMES MEASE, *Secretary.*

February, 1810.

MEMOIRS

OF THE

AGRICULTURAL SOCIETY

OF

PHILADELPHIA.

Some hints concerning Lime, occasioned by reading Darwin's Phytologia. By John Lang.

Read August 9th, 1808.

WE have for some time past heard much talk about two varieties of lime, the one useful or favourable to the growth of vegetables, when used as a manure; the other hurtful or pernicious, and therefore not to be used for that purpose; the first is termed calcarious, the other magnesian lime.

The first notice we have of this magnesian lime is from a communication of Mr. Tennant, published in the London Philosophical Transactions.

This is doubtless a subject of great importance to farmers, and in my opinion deserves to be more fully investigated. If all lime which contains magnesia is only *useless* as a manure, it must be of great importance to our farmers to be informed how they may be able to distinguish this from the calcarious lime; but much more so if it is as Mr. Tennant says, destructive to

vegetation, and that it *diminishes* the fertility of the soil. The distinguishing characteristics of these two varieties of lime, mentioned by Mr. Tennant, it would seem, can only be discovered either by analysing, (which process farmers are generally ignorant of;) or by making experiments by applying it to the soil. It is said that magnesian lime when used in too great quantities renders the soil less fertile, and wherever a heap of it has been left on one spot, vegetation will be prevented for many years; while of the other sort of lime, a large quantity is never to be found injurious; and that the spots which are entirely covered with it, become remarkably fertile, instead of being rendered barren.

From the above statement it would appear that by far the greatest proportion of all the limes used either in this country or in Europe are of the magnesian kind, or in other words must contain a certain proportion of magnesia. For my own part I have never seen pure calcarious lime, unless that made from calcined shells may be denominated such; though I must own I am not chemist enough to be able to discover the magnesian lime, except by its effects upon the soil, as above described by Mr. Tennant, and Dr. Darwin. The distinctions which some farmers make, of hot and mild lime, Mr. Tennant believes to mean magnesian and calcarious lime. And the Doctor says he is informed that the magnesian lime is preferred in architecture, and is said to go further in making mortar, &c. If this is the case I think it will be admitted that all the lime used in the United States, either for building or manure, is of the hot or magnesian kind;* as it is well known that the lime of this country is generally stronger and of course

will go further in making mortar, or as a manure for land than English lime. Were our farmers in this country to discover lime of so mild a quality that thistles and grass would grow up through the sides of the heaps of it; but at the same time it would require three loads of this lime to produce the same effects upon their land, as two loads of the lime now in use, I think they would surely prefer the latter to the former. Our farmers know very well that wherever they lay their lime heaps, every particle of grass or other vegetables will be destroyed; and that the spots on which it lay will not bear any crop for a year or two after, unless they are careful to remove it so clean, that no more shall remain on these spots, than the same proportion which they spread over the rest of the field. They likewise know that if they should leave their lime heaps exposed to the influence of the atmosphere, to successive frosts and thaws, rains and snows, &c. it would in time become as mild as the calcarious lime described by Mr. Tennant. But then it would be useless for mortar, and for land it would be like some medicines of which the chief recommendation is that if they do no good, they will at least do no harm; and for that reason they commonly cover the heaps over with sods, or straw, &c. till the land is prepared for putting it on. Our farmers likewise know that poor land will not bear so much lime as rich land, and that if they should by mistake over-lime their land, the succeeding crops will rather be hurt than benefited by it; and in such cases there is no remedy but either to give the field a dressing with dung, or let it lay a year or two till the heat of the lime is partly given out, and then it will have its

effect. From this I conclude that lime must act as a stimulant, and that the quantity applied to the land ought to bear an exact proportion to the carbonic, or vegetable matters contained in the soil. It is well known that stimulants used in small quantities are in some cases very useful in the animal economy, but in great quantities they will destroy animal life.

I would not by any means presume to call in question the results of Mr. Tennant's or Dr. Black's experiments; on the contrary, I am rather inclined to believe, that all stone lime contains a greater or lesser proportion of magnesia; but that the lime which contains the greatest proportion of that earth, is totally unfit to be used upon land as a manure, I think, deserves a second consideration.

Dr. Darwin observes that the substance called chalk-stone is almost wholly magnesia; now I know from experience that chalk-stone land is the most kindly to all sorts of grain of any soil I am acquainted with, and will bear a longer succession of severe cropping before it is exhausted. But perhaps it is the process of calcination which gives to the magnesia that caustic quality which renders it so hurtful to vegetation, as Mr. Tennant found by his experiments, that thirty or forty grains of lime did not retard the growth of seeds, more than three or four of calcined magnesia. From which Dr. Darwin concludes, that, as both injure vegetation in large quantities, they may both assist vegetation in small ones.

Consistent with the Doctor's remark I would just observe, that there are many substances which make rich manures, when used in small quantities; for instance

I have seen very great crops of barley got by sowing the land with pigeon's dung, as thin as we sow rye, and harrowing it in along with the seed barley; whereas had it been put upon the land as thick, or half as thick as we would put stable or barn-yard dung, it would as effectually destroy all vegetation as hot lime used to excess. The same remarks will apply to the dung of all kinds of domestic fowls, also to human dung and urine, so much valued in China. Common salt has often been recommended as a great assistant to the growth of vegetables when used in small quantities, whereas it is well known that the excessive use of it will render land totally barren.

It will be admitted on all hands that all animal and vegetable matters contained in the soil, must undergo a decomposition by some means or other, so that being thereby reduced to such a state as to be easily soluble in water, they may be readily absorbed by the tender roots, by some termed the mouths of plants. That the roots of plants naturally possess to a considerable degree the power of producing this decomposition, I have had occasion more than once to observe, in the case of planting potatoes with woollen rags instead of dung. I have seen fine crops of potatoes raised by dropping a small piece of woollen rag,* not larger than

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* Before the revolution war, I collected many cart loads of taylor's rags, chiefly woollen. Some I had cut in small pieces; others were ploughed in, as they came from the shops; after having been scattered by hand so as barely to cover the surface of about three acres of loamy land, much worn. I had a remarkably fine crop of *potatoes*, succeeded

the hand, in the furrow along with every sett of the potatoes when planted, and I have observed when the potatoes were gathered in the fall, that, in every instance where a potatoe plant had failed to vegetate, the rag was turned up intire, very little damaged by being buried under ground; whereas on the other hand, not the smallest vestage of the rags were to be seen in any part of the ground where the plants had succeeded and grown to perfection. Only I observed in some instances where the rag had been uncommonly large, a white mouldiness upon the soil about the roots of such plants, which seemed to me an indication that more nutritious matter had been formed than could be absorbed by the roots. Besides I observed the palms or tops of such plants were always large, and of luxurious growth, while the potatoes at the root were small and not fully ripe.

But there are other animal and vegetable substances which require more powerful solvents to prepare them for the food of plants; such substances must be decomposed either by means of the putrid fermentation, or by the application of hot lime, &c. But while the pu-

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by a great crop of wheat. On this clover was sowed. It lay for many years without other manure except plaister, in green grass after the clover. The effects of the rags continued longer than those of any manure I ever experienced; and I think the part of the field on which the rags were strewed, is the best spot in it to this day. It has been all limed, dunged and plaistered alike from time to time; and the soil of the whole field is similar in all parts.

R. Peters.

March 27th, 1810.

trid fermentation is going on, it is exceedingly noxious to vegetation, as we may see by the bad effects of putrid or stagnant water upon the roots of tender plants; while on the other hand, hot lime will check the progress of putrefaction, and at the same time very quickly effect the decomposition of various bodies; thereby preparing sweet and wholesome juices, whether they consist of carbon, phosphorus, oils, or alkali, or compounds of all or either of these. And I conceive if the lime meet with a sufficient quantity of such substances as it in this manner acts upon, it will by mixing with such juices, thus prepared, be thereby deprived of its caustic quality, in the same or somewhat similar manner to that whereby magnesia or chalk blunts, or sheaths the points of the sharp particles of acids. But if the lime does not meet with a sufficient quantity of carbonic or other matters in the soil to act upon, so that its caustic quality may be completely overcome, then in such case it will act upon the tender roots of the growing plants, in the same manner as it acts upon grass or other vegetables when laid in heaps on the surface. And this is in my opinion the cause why lime in some instances is hurtful, instead of being beneficial to land.

Rags chopped, and sown by hand, and ploughed in three months before sowing wheat or barley, the quantity six to ten hundred weight per acre, are used in England with success. In Kent they spread a ton per acre every third year for hops. As they hold moisture, they are adapted for dry gravelly or chalky soils, and succeed best in dry seasons.—*Gleanings of husbandry.*

J. Mease.

Upon the whole, I think instead of troubling our farmers about distinguishing the different qualities of magnesian and calcarious lime, it will be better to advise them to use lime sparingly on poor land, and at the same time to use every exertion to increase their dung and compost heaps, whereby their land will be prepared for the application of lime, not only with safety, but great advantage.

This note refers to the * in page second.

* Since writing the above, I am informed that there is in Marlborough township, Chester county in this state, a mild lime which answers well on land. But it is a notorious fact, that the great body of improvers, use hot or caustic lime with success; but clover ought always to be sown with the first crop. And though in some instances the grain crop may seem little benefited or even injured by the lime, the clover and succeeding crops will shew its effects.

J. LANG.

On Harrowing Wheat in the spring. By John Lang.

Read January 12th, 1809.

A paper lately appeared in the Aurora, which was likewise published a few days ago by Mr. Poulson, intitled *an accidental improvement in agriculture.* The subject was the advantages which might be derived from harrowing grain at certain periods of its growth, which had been discovered by harrowing a piece of oats, for the purpose of covering grass seeds. But the place is not mentioned, nor the person by whom the discovery was made. The writer concludes by observing that this discovery may be of use as an advantageous mode of hoeing in broadcast husbandry.

I remember many years ago of reading a very well written paper on this subject in some periodical publication, I think it might possibly be Dr. Anderson's "Bee." This writer besides detailing the results of sundry experiments, gives likewise the *rationale* (as the French say) in something like the following words. "In every instance where the soil has been finely pulverised, whether by harrowing, or frost, or by any other means; if heavy rains succeed, and afterwards dry weather, a hard and compact crust or cake is formed all over the surface, in which the young plants of wheat, rye, barley, or oats &c. stand fixed as if they were growing out of a brick wall, and by pressing against their tender sides prevent the expansion of their parts."

Another effect is, that this hard crust or cake prevents the free access of light and air to the roots so necessary to

produce the vegetable fermentation; besides this crust or cake by being completely deprived of its aqueous particles, become more contracted than the stratum immediately under it, hence it becomes divided by innumerable cracks or openings, into which multitudes of insects enter and find safe lodgings under the hard crust, where they remain secure from the scorching rays of the sun &c. through the day, and come up through the cracks or openings at night, to prey upon the tender plants, and return to their lodgements when the sun begins to be troublesome in the morning. But by passing a light harrow over the grain in the spring, as soon as the ground is so much hardened as to bear the horses feet without sinking, the young plants are relieved from that unnatural pressure, a free access is given to the light, and air to the roots; by stirring up the soil a new fermentation is produced, and the little insects are dislodged from their subterranean habitations, all their operations disconcerted, and they left to perish by the influence of the sun and weather. By this operation the grain in a few days acquires a fresh vigour, equal if not superior to what might be produced by a top dressing.

This writer likewise expatiates upon the great advantage of harrowing summer fallows after every ploughing, by which he says one half the ploughings may be saved, and the intention of the operation much better effected. He observes that if the soil derives any richness from the atmosphere it must be while it is in a state of fermentation, and harrowing is the best means for producing that effect; besides the seeds of annual weeds cannot be destroyed till they first vegetate, but

by repeated ploughings and harrowing each time, all the seeds which may be in the soil being brought to vegetate, will be completely destroyed.

I have often advised some of my friends in the country, to try this method of harrowing their grain.—I reasoned with them by analogy from the well known practice of harrowing their meadows in the spring; if the operation of harrowing grass meadows causes the grass to assume a dark green colour and vigorous growth, why may not the same effect be expected upon the grain. I have often thought that by repeated experiments of this kind, accompanied with minute observations, the hessian fly at certain periods of its existence, might be much disconcerted, if not destroyed; at any rate by giving the grain a start, it might outreach in some measure the depredations of the fly.

My friends would listen to my reasoning, and even acquiesce with my ideas, but when I enquired if they had made the trial, the excuse was they had not got a light harrow, or they had too much work to spare time for experiments, so hard is it to introduce any improvement though ever so valuable. But I am fully convinced that if the practice were to become general, the effects would be found equal if not superior to the valuable effects which have been produced by plaister of Paris. *See our Memoirs, vol.* 1, *page* 88.

On Peach Trees. By William Phillips.

Read July 14th, 1809.

Riversdale, November 23d, 1809.

Sir,

From a desire to promote the cultivation of fine fruit, and a belief that every publication of experiments that are attended with success, may at least have the happy effect of stimulating others in the pursuit of so desirable an object and eventually perfect it, I am induced to relate to you my mode of cultivating peach trees, as well as that pursued by others as far as they have come under my observation, together with the effects.

Seven years past when I took possession of Riversdale farm, I planted 30 peach trees in a grass lot which had not been ploughed for at least twenty years, and was very tough and bound. The first and second year they did not grow the least, and appeared as if they would soon die; my gardener wished to cut them down as he thought them not worth removing, but I preferred trying an experiment with them; which was to throw about half a peck of well slacked lime (which had been exposed to the weather several months) round each, the following spring I was agreeably surprised with their very thrifty appearance they bore as many fine peaches as they could support, and though the ground had not been dug it was perfectly loose four feet in circumference round them: they grew very much that year, and have continued to produce me a

great crop every year since, which increases with their size, and they are now large trees. Since the first year I have had the ground annually dug about four feet in circumference round them, and I do not find the worms have attacked them yet; from accident two trees were neglected for two years after I limed the first, they scarcely bore a leaf; the ground was so hard as to be impenetrable to the roots. I have had lime thrown round them since, and they have recovered and borne some fine peaches, and will I believe grow to a good size; the success of this experiment having convinced me that I could successfully raise peach trees on grass ground, I have been induced to plant out upwards of eight hundred in a field that will be alternately in grain and grass, some of which bore very fine fruit last summer. Although the ground has been in clover since the trees were planted, they have a very healthy appearance, and bid fair to be very durable, but that, time only can ascertain, for my own part I am perfectly satisfied if they bring me only four good crops, for the trees are then worth nearly as much for fire wood as I pay for the young ones. I would recommend digging round the trees once a year it mixes the lime with the earth, much to the improvement of the soil; fresh slacked lime will not answer, as I have known a young orchard entirely destroyed by it, which has caused an opinion to prevail that lime in any way is prejudicial, and I was cautioned by old farmers from using it; but in the way I used it, after it had been deprived of its excessive heat by a long exposure to the weather, I am very certain of its producing the most beneficial effects on all kinds of trees. I have applied it to upwards of fifteen hun-

dred apple and pear trees, besides the peaches, all of which evince its good effects: a load of forty bushels, after being exposed to the weather from October, till June served for about eighteen hundred trees.

I have now given the result of my experiments, and will relate to you what has come under my observation. An ingenious farmer, Mr. Ashton, in my neighbourhood a few years past, planted three hundred peach trees on about three acres of ground; I saw them last summer, they were very thriving, and he lately informed me he had gathered about five hundred bushels of good fruit and sold them readily on the ground at a dollar and fifty cents per bushel, he adopted no other mode to bring them to perfection than ploughing: he informed me that he had raised a crop of Indian corn on the ground every year since he planted the trees, and that without manuring, but the ground was in good order when he planted them. Thus, by the trifling labour of planting the trees which he raised from the stone, even without being inoculated, he obtained more money from those three acres than his whole farm would have rented for, and that too without losing one year's crop from the ground, the faithful cultivation of which in procuring other crops insured him success in his crop of fruit. Thus you see the peach when constantly cultivated will succeed without lime or any manure; though in grass grounds I am confident they would not.

With respect to plumbs and nectarines I have tryed various experiments without success, and though I have about fifty trees which are healthy, blossom well and bring their fruit to a considerable size, yet they all drop

before they come to perfection: and I have never got one nectarine except from a young tree planted in the fall which yielded me fourteen fine nectarines the ensuing summer; since when I have not had another, and I find the older my trees are, the more they are infested with insects, from which I conclude that were they attacked on their first appearance, by destroying the eggs in the fallen fruit, or otherwise, it might prevent their increase and eventually destroy them.—For several years my family have been supplied with the finest plumbs by a neighbour, who is the only person I know of who has had uniform success with them, last year while his trees were in full bearing, I carefully examined them, particularly as respected their culture and local situation, and I found that no uncommon pains had been taken with them; on the contrary, they appeared neglected as was evident from the numerous dead and broken limbs that hung about them, and that the very great success he had, could only be attributed to their situation, which was at the place where his hogs laid, and were fed; he told me that the hogs never let a plumb that had fallen remain many minutes undevoured, and thereby destroyed the insects that hung about, and the eggs that were deposited in them, though of late there had appeared but few insects about the trees.

How easy would it be to inclose a piece of ground for the purpose of feeding hogs in, which if planted with the best plumb trees, might be made to yield more profit than twenty times the same ground would in grain or grass, when it is considered the enormous price that fruit commands, no doubt owing to the difficulty of

raising, which I am confident might be surmounted by the above mode.

I should now apologize for trespassing on your patience, were I not certain that your real zeal in similar pursuits would render it unnecessary, and remain

Yours sincerely,

WILLIAM PHILLIPS.*

DR. JAMES MEASE.

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* The success of the fruit on trees in the plantation frequented by *hogs*, is evidently owing to the destruction by them of the *curculiones*. See Dr. Tilton's letter, vol. I, page 187. Mr. Phillips's farm is near the Delaware. Peaches generally thrive best near rivers; and especially those of brackish water. Digging round all trees is highly beneficial. See Mr. Coxe's letter, vol. I, page 217. The lime promotes healthy vegetation, but when the worm, or *curculiones* get possession, they are not affected by lime. These latter are the master-foes to all fruit. The fallen fruit is their nursery, and whatever destroys that, is their enemy. Cherries and other common fruits are in such plenty, that the banishment or extirpation of the *curculio* is an event more anxiously to be wished, than expected. They avoid moist atmosphere and salt air, on the borders of rivers or the sea. In cities and towns they do not delight.

This is a bold and laudable experiment made by Mr. P. on this short lived tree. The result we shall be anxious to know. We have unwilling doubts as to duration.

On Onions. By William Phillips.

Read February 14th, 1809.

Philadelphia January 15th, 1809.

Sir,

Some years past upon a journey through Connecticut, I was surprised at the very great difference between their mode of cultivating onions, and that usually pursued in Pennsylvania; and was forcibly struck with the superior advantages of theirs, which enabled them to raise prodigious quantities; for it was not uncommon to see fields of ten acres occupied by them.—Since that time I have frequently proposed to the gardeners around this city, to try an experiment upon their mode of culture, which is, to sow the seed so thin that they may stand at the distances at which they plant their young onions (called seed onions) which mode I was impressed with a belief, would bring them to perfection in one year, as it does in Connecticut, our summers being as long, and I believe the climate as congenial to them as that of the state just mentioned; they however universally objected, asserting that they would not obtain their full growth in one year, though I could not find that any one had really ascertained it. I was therefore induced myself to try the experiment.—Four years past I had a piece of ground prepared in the usual mode and season, and sowed the seed about three inches apart, (which I found could not be done with regularity in any other mode than putting the seeds in a bottle, which was afterwards corked and a quill fixed

through the cork, which enabled the gardener to drop it with facility equi distant.) The ground was attended to as usual.

The result was, that I had as good a crop of onions, and as large as what was gathered from an adjoining bed that had been planted with small onions in the old mode, with this difference only, that they were a few days later, which was a material objection, as ours obtain a superiority by reaching a foreign market, before those of Connecticut. It then occurred to me, that that obstacle might be overcome by sowing the onion seed in September, after a crop of peas, beans, or any early vegetable or grain, was taken off. Therefore the next fall, I had a large spot of ground prepared and sowed it the second week in September; they attained a good size that fall, and were tended as other onions next spring, and I had the satisfaction to find them as early, large and numerous as any produced that season, and generally the largest I had ever raised; since when I have pursued no other mode, and have not failed except in one bed which the gardener had neglected sowing until the middle of October, which I found was too late, a part of them being thrown out by the frost, as they had not obtained a sufficient hold of the ground.

The comparative advantage of this, over the old mode of culture, must be very evident, as it is a saving of nearly half the labour as well as time.

By the old mode they must be sowed and gathered, planted out the next year, and again gathered, two years occupation of ground, as also a lapse of two years before the farmer receives his reward for labour.

By the mode recommended, one sowing and one gathering only are required, the ground is occupied but one year, when the farmer can receive his compensation—which in duration is equal to a crop of wheat or rye.—With a hope that this experiment may be attended with equal success by others,

I remain yours sincerely,

WILLIAM PHILLIPS.

DR. JAMES MEASE,
Secretary, Agric. Society, Philad.

On Onions. By John Lang.

Read March 14th.

Philadelphia, March 14th, 1809.

Sir,

I think it was an observation of Dean Swift that the man who improves one acre of land so as to produce as much as two acres did before, deserves better of his country than all the race of politicians put together. Upon the same principle the traveller who carefully observes the various modes of culture of any particular plant, and attempts to introduce an improvement (though ever so trifling) into his own country, is a good member of society.

Our member Mr. Phillips was surprised to find that in Connecticut, onions were brought to full perfection in one season; whereas in Pennsylvania two seasons are required. I was no less surprised than Mr. Phillips

when I came first to Pennsylvania, to find that onions required two seasons to perfect their growth, in a country where I found vegetation in general so much more rapid than I had been accustomed to see it in my native country, and in a country too where the climate is so much better, and the summers longer than in Scotland. I immediately concluded that this must be accounted for from the absurd mode of culture which had been introduced by the first settlers of the country, and its continuance owing to the great difficulty which I have always observed in rooting out old habits. I inquired of gardeners and others for their opinion on this subject, but got little or no satisfaction. I then determined to try the mode which I had always seen practised in Scotland, and which I myself had followed for many years. The result was, my onions were much smaller than those which I used to raise in Scotland; and though, inferior in size to those raised in two seasons here, they were harder and better for keeping over winter. I did not observe the circumstance which Mr. Phillips mentions of their coming some days later, as I only raised them for the use of my own family.

After I had lived in this country a few years, I had occasion to observe that the great heat and dry weather which generally sets in here about the first of July, and continues till the middle of September, has a great tendency to disconcert the intentions of many European plants, particularly those of them which have small fibrous roots, and go but a small way into the soil in search of food. These when the moisture is so completely evaporated, and the soil becomes so very dry, either perish entirely, or assume a premature ripeness.

For instance the daisy, which grows wild in great profusion in the pasture grounds in Scotland, cannot be kept alive here but with the greatest care. The oats of this country where they ripen in a few days, produce a poor, thin, shrivelly grain, compared with those of the North of Europe where they require as many weeks to ripen as days here. The onion likewise is a plant whose small fibrous roots reach but a short way into the soil, and of course is soon dried up; besides it is a plant which requires a great quantity of nourishment, and for that reason must not only have a very rich soil, but a constant supply of moisture to bring it to full maturity.

The potatoes of this country likewise when the dry weather sets in, generally assume a premature ripeness, and if showers afterwards occur, the bulbs being already hardened, do not swell any more, but take what is called the second growth. This I conceive to be chiefly owing to an error in the prevailing mode of culture, which I think I have completely obviated by a different mode I have practised, and which I shall make the subject of a future memoir.

Here I would beg leave to observe farther, that most of the land in the neighbourhood of Philadelphia being alluvial or made ground, it acts like a filter for drawing off the moisture which should nourish plants; besides there exists a stratum of sand at different degrees of depth, which must attract the water, and assist the filtration; (this circumstance together with the burning hot sun which prevails here in the latter part of summer completely deprives many plants of moisture, except such as have long tap roots, or strong fangs which

go a great way into the ground;) whereas in the case of primitive ground where the sub stratum is in many instances almost impervious to water, the moisture is much longer retained in the soil.

I have never been in Connecticut, but I was some weeks in September 1797 very near the borders of that state, in the state of New-York. I there observed the climate to be considerably different from that of Pennsylvania; in particular the pasture was greatly superior. This was an evidence to me that the soil was not apt to be so quickly deprived of moisture. Perhaps this may be partly owing to its nearer vicinity to the ocean, and this may be one cause why Connecticut is better adapted to the culture of onions than Pennsylvania. The mode of cultivating onions in Scotland was as follows: the ground intended for that purpose was very well manured in the fall with rich old rotten dung, care being taken that it contained no seeds of weeds or grass,* this is well turned in and left so for the winter. In the the month of March following it is dug again and smoothly raked, and at the same time formed into beds two feet wide and of a reasonable length, with alleys between for the convenience of hand weeding, on these beds the seed is sown broadcast. My method for sowing it equally, was to wet the seed with a little water, and shake upon it pounded chalk or whiting, roll it in the whiting and spread it out to dry. By this means I could see the seeds distinctly where they fell on the

* I have often heard it said that in Holland where onions are raised in great perfection, they generally use the dung from privies for this reason.

ground, and could thereby judge of its proper thickness. If any part of them was observed to be too thick when growing, part of them were culled out for pot herbs, and the rest left for a crop.

I still think the above mode deserves farther trials here, if the ground were made previously rich enough, the seed early sown, and properly tended.

I am Sir respectfully yours,

JOHN LANG.

DR. JAMES MEASE.

On Live Hedges.

Read May 9th, 1809.

New-Hampshire, Stratham, April 6th, 1809.

Gentlemen,

I saw in the Portsmouth Oracle, an advertisement by the Agricultural Society of Philadelphia in 1806, soliciting information in the art of agriculture; and having been ten years in the farming line, I have tried many experiments in almost every branch that our climate and soil will admit. From your advertisement live fences appeared to be of great importance in your views. I have been making them more or less every year since I have farmed, with some variations as to the mode. When I purchased my farm there were a number of the English willows on it; old ones had been cut off and young ones had shot out, so that I could get a plenty of stakes: I set many hundred rods of these willow stakes on different soils and in different forms; in the mean time I raised nurseries of poplars which I supposed I should prefer to the willows: I think it not worth while to give the whole particulars of the willows, as I think poplar far exceeds them for making live fence. I have set out the poplar intending them for posts when large enough; I have set many hundred rods in this order; some are large enough to nail to. I intend topping of them when I nail boards to them, that they may be the more firm and steady; I think there are many advantages in these sorts of posts. The poplar I believe is so well known in the United States,

I need not recommend them. I will only observe, that they are the most easy tree to propagate of any known; that they are suited to almost any kind of soil; a shovel full of manure is as beneficial to them as to a hill of corn. Before I saw your advertisement, I had laid out the following method for making live fence: last season I tried the experiment with I think the greatest success. I laid up a mound two or three feet high in the following manner: I took square spades and shovels, and cut out the sod in squares as deep as it would hold together, as much a slant as I wished to carry up the sides of the mound, laying it with care as you would lay brick, breaking joints, heaving in the loose dirt as the nature of the business requires. I made a trench on each side of the mound in course three or four feet wide and one deep, and left about one foot each side of the mound of the sward, unbroken to support the mound. I left the mound when completed about two feet wide on top and a little dishing; I laid on top of the mound manure and mixed it with the loam, I beat the sides of the mound with spades to even and harden it together; I then took poplar limbs and shoots not material which, sufficiently long to reach from the top to the bottom of the mound, that is to the old surface, leaving them three or four inches out: if long enough to top they will do better; I sort them; I take a suitable stick and make holes at six inches distance along the top and middle of the mound, I set the cuttings in them: a temporary fence is necessary if exposed to creatures, on each side. By experience I found the cions rooted from top to bottom. I think it best to lay the manure to the bottom of the mound. I view the manure to be

very essential. This experiment was made on very light sandy soil. It is now almost a year since I made the experiment, and it is very promising: the frost is now out, and the mound remains perfectly firm and whole: the cions started earlier than those that were set out before and had root, and continued growing through the season. We experienced a considerable drought in August and September, but it did not affect them in the least: they grew from three to four feet high, leaving all their shoots on: I prefer leaving the shoots on as they will grow the stronger, and will make the better hedge: if one chance to die, the limbs will fill up the vacancy, though there was not one of mine died excepting a few which were girdled by a large dung worm, which I supposed was occasioned by laying the manure on top: I would recommend keeping the weeds from the top of the mound. The calculations I make on this kind of fence are these: In the first place, it is the most ornamental of any I ever saw, or can conceive of; 2d. It will come to perfection sooner than any other live fence; 3d. It will be by the high way on loose soil, a means to harden the way by the shade and roots; 4th. It will be comfortable for the traveller both summer and winter. I calculated very great advantages from it in the winter season, as it will break the winds, prevent the snows blowing in drifts; the trees will attract the sun: it will be much warmer in winter as well as cooler in the summer by the shade. I make a great calculation on the growth of this fence for fuel: a few hundred rods will support a family with it for fire-wood. I have made a similar kind of fence where there was not sod to support the mound up a

ridge; set them in the same order as above, it flourished very well; but will require longer nursing, and will not stop the small animals so complete as the other. I calculate the hedge on the mound will be sufficient fence in three years from the time set out; the lower kind in five or six. Two good men will lay up ten rods in a day of the mound. I expect to make one or two hundred rods this season. I was going to let it rest one year more before I informed you; but in considering the matter I thought if you should approve of the method you would like to try the experiment or to recommend it this season, if any further information is wanted, or any proof I will give it with the greatest pleasure.

ABEDNEGO ROBINSON.

Society of Agriculture, Philadelphia.

On Diseases of Swine.

Read June 13th, 1809.

Northumberland 31*st*, *March* 1809.

Sir,

A friend lent me a few days ago the first volume of the Memoirs of the Philadelphia Society for promoting agriculture:—I have perused it with much pleasure;—it will no doubt encourage those interested in agricultural pursuits to make the communications which the society invite.—Observing in the preface, that the society call particularly for information "on the diseases of our domestic animals,"—I cannot refrain from giving you an account of the diseases which within my knowledge have attended an animal, that few writers have thought worth while to notice; but which Dr. Rush, in his admirable introductory Lecture, (published by the society,) has rescued from that state of obscurity and neglect under which it had so long lain dormant: you will readily perceive, I mean the HOG.—I wish the information I am about to give may be acceptable to the society, but I own my chief object in writing is in the hope, that it may induce others to come forward, and supply information on a subject on which it has either not been *fashionable* to treat, or perhaps from the mistaken idea (to quote the words of Dr. Rush) "that the hog like the miser, can do good only when he dies."—I have generally in my pens from 100 to 250 of those animals: they are of course subject to diseases; one with which I was most troubled was a disorder that

I believe might be called the staggers, it attacked them generally in the month of September: the hog would all at once turn round very rapidly, and if assistance was not at hand, would in less than half an hour, die. It seldom happened that one alone was attacked, six, eight, or a dozen would be seized in the same way in the course of a few hours: they were immediately bled under the ear and at the tail; some sweet milk and brimstone were given to them; and on which they were afterwards fed till they were well, or died; a few recovered, but a greater number died; this however was the only remedy that I knew of, until the year 1803, when a young man who had lately arrived from Wales and who was then working in my still house, put into my hands an old pamphlet, the title page of which was nearly torn off, but it was printed, I think, in the year 1706 or 1707, and was composed of receipts for the cure of animals; there was described a malady among hogs, which I was satisfied was the same as my swine were attacked with and the cure pointed out was as follows. "You will see a bare knob in the roof of the mouth, cut it and let it bleed, take the powder of loam and salt, rub it with it, and then give him a little piss and he will mend." (I give it you in the authors own language.) Every year my pens were more or less subject to this disorder; and since it came to my knowledge I have invaribly followed this prescription, with certain success, for where I used to lose six I do not now lose more than one: but although the pigs recover they never thrive so well after such an attack. The causes which this author gives for the disorder, I cannot apply to my pens, he says, "the staggers, in hogs proceeds

from corrupted blood, arising from lying wet: through filthy rotten litter and want of meat." My hogs lay dry, they are never in want of meat, and have fresh litter given to them when the pens are cleaned out: which they are usually three times a week. It should be observed that my largest or oldest hogs have never been attacked by this disorder: it is confined to those of middle size, say pigs from eight to ten or eleven months old.

In the fall of 1807, a disorder broke out among the larger hogs; it was not confined to my pens alone, but it was an epidemic which raged among the swine throughout this part of the country, and it progressed so rapidly among mine, that I expected at one time to have lost nearly the whole of them: the people in the neighbourhood called the disorder the *sore throat*.—A hog would come up to the trough, eat, apparently in good health, and in ten minutes after, be dead: and those which were attacked were the finest hogs in the pen: their food was good and they had plenty of running water to wallow in, (a thing absolutely necessary in the summer season,)—I had several of them opened, but did not discover any particular cause for such a sudden *exit*, except a trifling swelling in the wind pipe and black pustules on the tongue.—A friend and neighbour sent me a late volume of the Museum Rusticum and of the Farmers Magazine; in the latter, vol. 3, page 105, I found the disorder tolerably well described *as far as to appearance in the hogs I opened*: but they call it measles, which I am certain was not the disorder; as I found however my old medicine for the sore throat:—*bleeding* and *nitre*:—and a diet of sweet milk, had no good effect,

I thought I might as well administer to the diseased animals the medicine which the magazine recommended,—antimony.—I began with great confidence in the medicine from the high character given of its virtues in several late English publications; I dosed two or three and they certainly did not die so speedily as under the other *regimen:* in the course of a few hours five or six more shewed symptoms of disease, I applied the same specific; but unfortunately they went from bad to worse, so that in two or three days I had only the skins left of thirteen very fine hogs: early one morning the fourteenth took sick and symptoms of immediate dissolution appeared on him:—I determined however to give no more medicine—I merely bled him under the ear and in the tail:—he bled freely—I then had him carried out (for he was unable to walk) to a clover field; he was put down, but he could not stand; I observed however though he was laying down that he began to bite off the heads of clover (which stood very rank) voraciously; I left him without much hope of his recovery, but still with the appearance of more favourable symptoms:—I came home to my breakfast, after which I again went out to the field and found to my great surprise the hog walking about and still feeding on the clover:—in two days he was perfectly recovered: that is, he fed with as much avidity as any hog at the trough. Finding the favourable change in this hog, I instantly turned my whole stock (about 180) on clover, of which I then had a five acre field nearly ready to cut the second time; the sacrifice was well repaid, for from that instant I had no more sick hogs.—Last year, about the middle of August which is the time sickness has

usually began among my swine, I turned out my whole stock on a luxuriant clover field; and in consequence there was neither staggers or sore throat among them: no sickness and no deaths. Until the last year I have never passed the fall season without losing some and I therefore intend (as long as I find it to answer, to pursue the same plan of turning the hogs on clover each succeeding year: I hope the same favourable result may be the consequence.

I differ with you with respect to *sour* wash being "the most grateful and alimentary to swine," in England, I know such an opinion prevails; but in this climate, I am certain, mine *eat most* and *thrive best* while it is *sweet.* I occasionally give them "*a little salt to their porridge.*" "*dry rotten wood,*" is a good thing, but I will take the liberty to mention what I think a better: we have three blacksmiths in this town, and my hogs eat up all the ashes or cinders they make: we haul it into the pens by cart loads, and the hogs will as you observe by the rotten wood, devour this at times with more avidity then their ordinary food.

When the hogs are put up to fat I do not find it necessary to give them *grit* of any kind: the corn appears to me to answer every purpose: perhaps it is owing to their having heretofore been accustomed to the wash; for when once upon corn they will not touch the ashes they formerly eat with so much apparent relish. About five weeks before they are to be killed they are put upon corn, and as much is thrown to them three times a day as they will eat; it is always given to them in the ear, for having been accustomed to the wash: mastication is a novelty and no doubt a pleasure to them; and I think it makes the fat the more solid.

If you think this communication will be worthy of the notice of the society, please to lay it before them; but if not, let it remain *entre nous*, and believe me with great respect and esteem,

Dear Sir

Your most obedient,

J. P. De Gruchy.*

Hon. Richard Peters Esq.
President Agric. Soc. Philad.

* My experience has uniformly been favourable to the *sour wash* (not *acetous*) both for health and economy; much less grain or meal will suffice; and its fermentation with water fixes the saccharine quality, so essential to nutrition. Salt is often given. I never pen my hogs in hot weather. Mr. D. G. is on a great scale; and must do it. His *still wash* may require to be sweet; under the circumstances in which his swine are placed. His chopped grain has undergone fermentation, before distillation; and I know his intelligence on the subject. In summer my hogs chiefly run on clover. Swine feeding on clover in the fields, will thrive wonderfully; when those (confined or not) fed on cut clover, will fall away. My use of rotten wood, continues to answer every purpose intended by its being given. I am much gratified, by the information that there are other substances answering, the same end.

R. Peters.

Colonel Pickering, on Hedges.

Read June 13th, 1809.

Washington, June 1st, 1809.

Dear Sir,

In a letter which I put into the mail yesterday, I asked you some questions, and made some requests and observations, which occurred on the perusal of the Memoirs of the Philadelphia Society of Agriculture: but I believe I omitted to speak of *live hedges*.

When I dwelt at Wyoming, and saw the havoc of fences by freshes in the Susquehannah, the importance of live fences struck me forcibly; and had I continued there, should doubtless have commenced their introduction. When in 1800 I went into the back parts of the state, away from bottom land, I thought of your hemlock hedge, of which you have given me the history, substantially, as now recited in the memoirs. It appeared to be a perfect fence, easily formed, and with this advantage, that (as I supposed) no domestic animal would brouse it. In this view I mentioned it to some settlers in that quarter. But they told me that sheep would eat hemlock. Cattle also, I now know, will taste it. But so they (sheep particularly) will eat the thorn; on which when young and in hedges, if accessible to sheep, they commit such depredations, that Lord Kaims says he could hardly refrain from murmuring against Providence.

More than twenty years ago I read Anderson's Essays on Agriculture, and I well remember his *principles;* the only rational ones I ever saw, for making thorn hedges. I have mentioned them to several persons who are cultivating hedges: but they do not give themselves the trouble to examine them: they let their gardeners take their own course. You will find his directions, I think, in his first volume. I have recited them in substance to Mr. Main, and added that his other countryman, Lord Kaims, had suggested a like mode of training a thorn hedge. Mr. Main had not heard of either Anderson or Lord Kaims. Yet he is distinguished for his intelligence. Mr. Main's hedges I have repeatedly seen. If, as you mention, he proposes in his pamphlet, to *slope* the sides of his hedges, *tapering* them *upwards*, I have forgotten it. His own, however are not so formed. He sets the plants only six or seven inches asunder, so that when well grown, the stems alone would form a fence. I have a thousand of Main's hedge thorns, which I shall set in corresponding rows eventually to form the fences of the avenue from a public road to my house; and I shall train them according to Anderson's directions; of which an essential one is, *not to cut the top of the* STEM *until it has acquired sufficient stability to resist even a bull.* Till then, the *sides* only are to be pruned, or *sheared*, and in slopes upwards to the heighth of four and a half or five feet, to preserve the side shoots down to the ground. For if, like your hemlock hedge, they will retain the lower branches, when the sides are pruned perpendicularly, much more will they do it when the sides are sloped, and give them a perfect exposure to the sun, air, rains and dews.

From what I had occasionally read of English thorn hedges, I doubted their constituting complete fences—I doubted the more, because it seemed to be a common

practice to introduce *trees* into them. And Lord Kaims expressly says, he never saw a good hedge in England.

Mr. Bordley handsomely compliments the planters of some hedges in the Delaware state. They probably made a good appearance when young: but I have seen them repeatedly within the last six years; and in my eye they possess neither beauty nor efficiency. They consisted, in fact, of thorn trees twelve or fifteen feet high, with bushy tops and naked stems, and gaps innumerable. In that condition I viewed them as nuisances. They occupied much ground, and required many posts and rails, (which, shaded and long remaining wet with rains, would soon become rotten,) to fill the gaps. Within two or three years past, the proprietors of some of those hedges have found some labourers, (I believe English hedgers) who have plashed and topped the trees; and interweaving them with the stems and stakes, have made good fences for so long time as the dead wood will last.

Mr. Main, in his pamphlet, refers to M'Mahon's directions for raising thorns from haws—a process requiring a preparation of a year and a half prior to the sowing of the haws. But in the autumn of 1807, in conversing with an English gardener, here, (Theophilus Holt,) I found that the haws would vegetate the first spring. He showed me a bed of seedings which had grown from the haws of 1806. I desired him to gather me a quantity of haws of the hedge thorn cultivated by Mr. Main, (they are to be found scattered in every part of the city) which you call *cratægus cordata*, and to mix them with earth and keep them until the ensuing spring. Then he sent them to me in a box (remaining mingled

in the same earth,) and I forwarded them in a vessel to Salem. I did not reach home till near the middle of May; and my son Henry, occupied in other business, and forgetting them, they remained in the box till about the 20th, when I opened it, and to my regret, found all the haws had not only sprouted, but sent out thin radicles so far, and were so entangled in the earth, that it was impossible to separate without destroying them; so that out of perhaps two thousand or more, five plants only survived and grew. It was a satisfaction however to have the certainty that this sort of thorn, at least would grow the first spring. Holt said that in England the white thorn did not vegetate till the second. I mentioned this fact to Mr. Main, a few days since. He admitted that they would sometimes grow the first spring, but that sometimes they failed.

Seven years ago, I told a relation in New-Hampshire, who, wanting rocks, was obliged to fence his fields with rails and boards, that he could form hedges in his light land even with white pine—which abounded.—The young trees (not crouded together) sent out long limbs near the ground, and regularly upwards, in a suitable slope; they only required clipping to multiply the branches.—The European Larch (of which I have forty or fifty that are from four to six feet high, and many of which last year bore cones,) are admirably adapted for hedges. They send out numerous branches from their stems from the ground upward, and will grow well on poor land. Dr. Anderson, (third volume of his Essays on Agriculture,) says that they grow fastest in the poorest soil, and bleakest exposures. They may be pruned at any time in the summer; and such as I have

pruned in June, close to the stems, have had the wounds entirely covered by autumn. They differ a little from the American Larch, having larger leaves and cones. From the high character given of the European Larch by Dr. Anderson, I was induced to import from England those I have. Probably you will think his account rather exaggerated. The cones of the American Larch, (which are plenty in Maine, and not unfrequent in Essex county,) when just grown, are very beautiful, both white, (or pale green,) and purple, the latter especially.

The seeds of apples from the cider press, (common crabs, or ungrafted fruit) will produce trees bearing, when young, spurs or sharp pointed as the spines of thorns. These trees might be selected for hedges; and perhaps no shrub or tree would make better. Brouzed every summer and kept low as I have seen single trees in permanent pastures, they form an impenetrable mass of limbs, and so close, that a bird could not find his way through them.

Very truly yours,

TIMOTHY PICKERING.

RICHARD PETERS ESQ.

On Hoven Cattle. By John Steele.

Read August 1809.

As the President in the communication on hoven cattle, with which he has favoured the society, has referred them to the Museum Rusticum, I beg leave to submit to their consideration some remarks on the papers inserted in that publication by Mr. John W. Baker. I deem this the more important, since the errors and inconsistencies of this writer, with respect to the seat of the disease, the necessity of piercing the gut to let the wind escape, and the little fear that should be entertained of *wounding the intestine*, appear to have been adopted by the President; and may, whilst sanctioned by his name, be productive of injurious consequences in those parts of the country where the introduction of clover is recent, and where little experience of the treatment of hoven cattle has been consequently acquired.

That the first stomach which contains the crude aliment, previously to undergoing the process of regurgitation, is the principle seat of the disorder, is evinced, not only by the relief afforded by natural eructation, and by the extraction of the fixed air through a flexible tube introduced through the œsophagus, but also by piercing the paunch in the most prominent place between the hip bone and the short rib on the left side, which is the ordinary method.—In the last case a considerable quantity of vegetable matter in a high state of fermentation generally obtrudes through the orifice, but I never witnessed any emission of wind from the abdomen.—

Indeed in extreme cases, the cavity of the belly is so much diminished by the distention of the paunch, as to render it probable, that the air therein contained if any there be, has no agency in the production of the disease.

The pressure of the first stomach or paunch, against the interior integument of the abdomen, probably led Mr. Baker to mistake that ventricle for the cavity of the belly, and gave rise to his erroneous opinions on the subject. Although I do not conceive any danger of wounding the intestine, can arise from piercing the animal in the most prominent part of the belly, its various convolutions being confined to the opposite side, yet I will venture to remark, that I think wounds inflicted in that extremely tender part are attended with more danger than Mr. Baker and the President seem to imply. An eminent medical writer says, if one of the bowels be slightly cut, the edges of the wound retract equally; and if it be penetrated or cut through, they curl themselves back so as to invelope the upper part and the inside is thus completely turned outward.

If this high authority had not been sufficient to convince me that wounds in the intestines are much to be feared; my experience would, for I have in reiterated instances known wounds in the bowels of cattle, inflicted by accident, to prove fatal.

Ardent spirits given to hoven cattle in doses of about a pint, diluted with water, in conformity to the directions of Dr. Darwin in his Zoonomia, frequently proves efficacious in the first stages of the disease, but I question whether any remedy in the last stages of it, is equal to piercing the paunch.

A description of the flexible tube above alluded to, is to be found in Rowlin's Cow Doctor, a work which has obtained considerable celebrity in Great Britain.

JOHN D. STEELE.

Near Downingstown, 10th June 1809.

DR. JAMES MEASE.

OBSERVATIONS.

Mr. *John Wynn Baker* was one as much confided in, for his integrity and veracity, and was as laudably useful in practical experience on the subjects he professed to know, as any person of his day. He enjoyed the patronage and esteem of the most respectable characters of his time. Whether his anatomical knowledge was as accurate, as was his information upon other subjects, it is not essential to discuss. I always receive information with thankfulness; and wish those qualified in this much neglected branch, of the veterinary art, would pay more attention to it. A desire to communicate what I conceive useful, often impels me to treat on subjects which I find not *generally* known; though perhaps by many better understood. In this case I do not believe I have mentioned any thing new. For *facts* falling under my own observation I can vouch: As to *theories*, I leave them to the learned.—The facts mentioned by Mr. Baker are indubitable; and have been frequently verified. There is certainly greater safety in piercing the beast on the left side, between the hind rib and the hip-bone, as directed in page 6, of our first vol. Mr. Steel agrees in the necessity and efficacy of penetrating the paunch. His apprehensions as to other parts, may have some foundation, but are much exaggerated. His endeavours to rectify errors are praise-worthy. But it would be much to be lamented, if any

alarms should deter from a remedy which in multitudes of instances, has saved valuable beasts from otherwise inevitable death. The risk of the incision in any part of the belly, or sides, cannot be greater than that of the disease, if left to its fatal progress. Let all dangerous parts be avoided; but let no fears prevent the surest of all remedies. As to the alarm about wounding the intestines, I have conversed with one of the most eminent of our physicians,* and a deservedly celebrated surgeon,† who is generally acknowledged to be at the head of his profession. They agree that although it is best to avoid them, yet that wounds of the intestines, are, by no means, often attended with the consequences, or dangers, which have excited Mr Steele's apprehensions.

Dr. Darwin's flexible tube (and the same thing has been long ago mentioned by Dr. Munroe) is doubtless very proper. But little is known of its comparative superiority. A farmer would never think of providing it; but knives are always at hand. The use of this tube, shews that air is the cause of the disease, when confined and elastic. *Potash*, in the early stages, has been found very efficacious, given in drenches or balls, in quantities of not more than quarter or half an ounce at a dose, at intervals, 'till its effects are produced. Any *alkali* neutralizes the gas, or elastic air, which would occasion death. To prevent the viscera being abraded, raw linseed or other oil, may be given.

However scientific may be Mr. Steele's reasoning as to the interior of the animal, I avoid controversies (even if I were qualified to sustain them,) on subjects whereof facts are the best expositors. I will not therefore agitate this question; or perplex it with discussions about locality, or speculate as to the nature of the disease, or the air generating from the cause of it; and occasioning the dangerous malady. It is enough to observe, that in general, those whose cattle meet

* Dr. Rush. † Dr. Physick.

with these critical attacks, have neither time nor capacity to reason about the structure of animals, in parts either visible or hidden. If they theorize on the subject, fear and hesitation are the result—and the beast dies, before their conclusion is formed. The violent explosions of wind, issuing from the orifice after incision, may not have occurred under Mr. Steele's observation, but the fact can be proved by many witnesses. Nor would it be a difficult task to produce cattle now perfectly sound, and in high health, which have been pierced for, and cured of the disease, in other parts than those generally known to be the most safe. If a perforation or incision fails in the part recommended;—I repeat—that no danger apprehended from wounding the intestines, can be put in competiton with *the certainty of death*, unless this kind of relief is *boldly* and *instantly applied*. Country people want stimulus and support in such undertakings; and not additions to their natural hesitations. And the chances are more against the beast not being pierced at all, than its being done in a wrong place. In an instance falling under my own notice, the account given by Mr. *Baker* was read, after the operation and effect were over. Every one present declared, that had he been a witness to the whole process of disease and remedy, *he* could not more exactly have described every symptom and circumstance then actually exhibited. In one instance a small tin candle mould, and in another a hollow piece of elder, was inserted into the orifice; to prevent its closing, and the exterior and interior incisions from being displaced, in the way described by Mr *Baker*.

I am aware that zeal misapplied produces many irreparable mischiefs, both in the small and great concerns of the world. But I am so confident on this subject, that I hesitate not, to confirm all I have said, in the communication upon which Mr. Steele has (no doubt from the best motives) animadverted.

RICHARD PETERS.

Relative to Hedges. By Paul Cooper.

Read December 13th, 1808.

Woodbury, N. J. August 4th, 1808.

Esteemed Friend,

At thy request I have made some additional remarks on Hedges.—I was surprised to see in the transactions of your society, the apple tree, and the walnut recommended for live fences: such plants as are easily propagated from cuttings must be preferred, I have found it difficult to get the walnut to live one year after setting out, the sweet gum or linn, grows fast, bears plashing very well, is very easily cultivated, and makes a sufficient fence in a few years. The sour gum in low land will also in a few years make a very good fence: the white mulberry, the button wood or plane tree,* grows rapidly, is easily propagated from cuttings, or seeds, and makes excellent fire wood equal to hickory; this is important to have growing, and to get fire wood out of our fence from time to time; in some situations and soils the thorn may not be injured by insects, I would however by all means make the trial. I find in some parts of my farm the thorn grows very well, plants set out in 1802 by properly cutting the tops from year to year in order to produce a sufficiency of horizontal shoots, were in 1807 a sufficient and handsome fence without plashing. In other parts of the same farm, I should not have a fence in twenty years of the thorn, but in this last soil

* *Platanus occidentalis. L.*

the sweet gum would thrive admirably, or the plane tree.

I have tried the red cedar: cattle are remarkably fond of twisting it and destroying it with their horns.

The willow in low grounds does very well; the Georgia poplar is very easily raised from cuttings, grows admirably even in very sandy soils, and from the trials I have made, appears likely to succeed very well.—The white thorn is often exceedingly injured by a worm or some kind of insect that kills the bark all around near the surface; I was discouraged from raising any more from the seed, although the insect did not kill the roots, yet so much dead wood looks very unhandsome: but the *Viburnum Prunifolium L.* or black haw, throws out many horizontal shoots, and is a remarkable hardy plant. I never saw it in the least injured by insects; it grows very plentifully in our woods, and may be raised in any quantity from seeds. I dig it up and set it out in the same manner that we do the thorn, and I understand since my propagating it, that others have recommended it. A number of the plants I have mentioned would thrive very well in a variety of soils, where the thorn would not answer any good purpose, and it must always be of consequence to choose plants suitable to the different soils on our farms.

Thy respectful friend.

PAUL COOPER.

DR. JAMES MEASE.

On Corn. By Joseph Lyman.

Read April 11th, 1809.

Hatfield, February 28th, 1809.

Sir,

Your letter of 30th, January, reached me early in February. I embrace the first leisure hour to attend to the contents. My publication of 1796,* is not at hand and it is uncertain whether I could find it. I know not whether I stated in that publication the condition in which my field was at the time of my seeding it with Indian corn. If not, it would be proper that you should know, that it had been previously, manured in a high degree, and the preceding year, if I recollect right, was cultivated with a crop of tobacco by persons to whom I leased it. With what I should call a slovenly cultivation, the 180 rods produced 2600 pounds of merchantable tobacco, and with due attention, might have produced hundreds more.

The next year after the tobacco crop, I took it into my own management, and improved it for Indian corn, according to the statement you have seen. As to the result there stated, it ought to be considered that the measurement of the produce was immediately after harvest; probably it would have been eight or ten per cent less, had it been delayed until February or March.

* For the piece alluded to. See the appendix.

The year succeeding my crop of Indian corn, I tilled the field I believe without any manure, and sowed it with barley and clover seed. The product was very great. A gentleman who had been an agriculturalist in Great Britain, viewed the barley when it had just headed, and told me that he had seen no field of barley in England superior to it. The crop by its own weight, and a heavy rain, fell, and by being badly lodged, was diminished, yet it was very considerable. I did not measure it, but it was I believe about 40 bushels per acre. The ground has been in grass ever since.

This same year 1797, I planted another field with Indian corn in my second method, viz. in rows of customary width, three or four feet apart, and in hills two corns in a hill, about eighteen inches apart.

This was to reduce the labour by the assistance of the corn harrow. This field was suckered three times as in the preceding year. But the land itself was not so good as the other field, nor had it been so richly manured. However, allowing for these disadvantages, the produce was, I believe as great as in the preceding year. But while the stalk was in full size, and in a full state about the time of setting for ears, a heavy tempest prostrated the whole, as it did other fields planted in the usual way. And although the crop was valuable, and more than I had expected, yet it by no means equalled the product of the former year. Yet I should say, that as far as the crops progressed, without any uncommon interruption, it was a good voucher for that particular method of cultivating Indian corn. In the mode of cultivating, especially my first mode of planting in squares of two feet; creeping under the plants on the ground,

to sucker the stalks, was very irksome to my boys, and the price of labour rising at this time out of a due proportion, and my other employments engrossing my time, I did not pursue the experiment. Since that time I have chiefly improved my small portion of land by letting it to others.

My neighbours are generally farmers, and are called good farmers in the old fashioned way; but they have too much land to invite them to make experiments, and to spend the summer upon a few acres. I do not know that any of them have tried the methods which my publication prescribed. They saw and admired the result of my experiment, but either for want of help or for want of zeal in making experiments, they went on in the old track—raising 20 or 30 bushels on an acre.—They had as many acres as they could improve without employing any additional labour on two or three acres, which would have filled their cribs, as full as they are commonly filled from ten or twelve. I have not omitted to pursue the method stated in my publication, from the slightest conviction that there is any error or defect in the system, but merely from my not being employed in farming, as my stated business. Too much of my time would be engrossed to pursue the course effectually.—Want of leisure and capital, prevented my course of experiments, in such a manner as the importance of the subject demanded.—My publication was designed to invite farmers of property, and practical husbandmen, to pursue the experiment. And I am persuaded that they might pursue it to as great advantage, as my publication supposes. Not looking much to my little portion of land, and unable to procure labourers at a reasonable price, or to oversee them if procured, I have committed my fields to other hands on lease. But were agriculture my line of regular employment, I should take the course I did in 1796, for the greater part of my corn land.

May I be permitted to suggest the great utility of wood ashes, in raising Indian corn? What my family do not want for domestic use, I generally apply as manure for Indian corn, by putting a handfull round each hill, after the first hoeing.—(We hoe four times.) I have observed the effects repeatedly, until I am satisfied that upon almost every kind of land one bushel of ashes will produce an additional bushel of Indian corn.—I have tried wood ashes and gypsum upon corn in the same field, and the field thought to be friendly to gypsum; the ashes have been less expensive and quite as productive.—I once sowed four acres of very poor land, with three bushels of flaxseed.—Upon two acres I strewed eight bushels of ashes. The ground which had the ashes produced 100 pounds of flax more than the other. While on the ground, the eye perceived but a slight difference in the two different parts of the field. But I found the harl much better. This I attributed to the ashes in killing the insects which prey on the roots of flax, after it has attained its size, and before it has procured its coat. Speaking of wood ashes, I will mention another experiment.—I turned up an acre of sward, and planted it with Indian corn. I applied after the first hoeing about ten bushels of ashes (which is a profuse and unusual allowance:) but before the field was ashed, my labourers had nearly exhausted the ashes—I direct-

ed them to leave a portion of the field; they left ground in it, without ashes.

At harvest, the ground manured with ashes, produced two or three times the quantity of the better land which I had neglected.—The one yielding, I should say, as much as fifty bushels per acre, the other not more than twenty. Ashes sprinkled on land lately turned up from sward, are most decidedly the most productive manure which I have tried. After Indian corn, ashes are most useful in ensuring a good crop of flax, both harl and seed. In laying land down to grass I have found barley the best crop. It is early off the ground, and gives great facilities to the tender clover to gain a firm root before winter. Flax has commonly been preferred,* as the crop with which to sow clover, but it comes of the ground late; it is spread on the ground and imprisons the clover still longer; and the pulling of the flax rends and disturbs the roots of clover and exposes it to death the next winter.

I do not know sir, that I have met your wishes in this letter.—If I have exceeded those wishes by the introduction of extraneous matter, you will be candid enough to excuse it and to carry it to the account of my sincere desire to promote the beneficial purposes of your institution.

With due esteem I am sir,

Your humble servant,

JOSEPH LYMAN.

DR. JAMES MEASE.
Secretary of the Agric. Soc. Philad.

* This alludes to his own vicinity.

The following letters though not written for public view, yet contain much matter which should not be lost. They are therefore thought worthy of being inserted among the transactions of the society.

On Gypsum.

Read June 13th, 1809.

Port Royal, Virginia, January 30th, 1809.

Dear Sir,

I have postponed answering your two obliging letters of May last, hitherto, lest the very great pleasure of your correspondence, should seduce me to be troublesome, in the number or length of my letters; and I fear you will allow my apology to be a good one, before you get to the end of this.

Your warning against a reliance on gypsum, and neglecting manure, induces me to give you an idea of my practices respecting both, in hopes of obtaining your corrections. For many years I have enclosed all my arable land at each farm, in one enclosure, and excluded grazing entirely, leaving the whole vegetable matter the land produces, to return, taking a crop of corn and one of wheat, every three or four years. To increase vegetable cover I sow large fields of clover, cutting only a small proportion for seed and for feeding green. These are treated with plaister, and the clover is plowed in dry, when the field comes into culture. It is cheaper to plough it in dry than green, on account of the different seasons of the year for the operations; and however

contrary to theory it may be, my experiments have not satisfied me that it is less nutritive to the earth, especially when well clothed with these vegetables until towards the end of the winter. This cover added to the exclusion of the hoof, keeps its pores open longer in winter to the action of the atmosphere, than ploughing itself; and defends it against sun as well as frost, whilst ploughing exposes it to both, my idea is, that this system is fitted for a combination with gypsum, and that such a combination may possibly succeed without the aid of manure. If so, it may be useful towards diminishing the deficiency of that article, for I agree with you, that nothing can be a complete substitute for it. To make the experiment fairly, I have set aside 200 acres, half to be cultivated in corn yearly, half to lie uncultivated and ungrazed, and the whole to receive an annual dressing of three pecks of plaister to the acre. The repetition of the culture being too quick for a perennial plant, I use the bird-foot clover as we commonly call it, to raise clothing for the land, having found that the plaister operated as powerfully on that as on red clover. This grass rises early, dies soon in the summer, abounds in seed so as to set the land thick the following year, affords a good cover, and nourishes a second annual, the crab grass,* which springs through it the latter end of the summer, and gives a fresh cover to the earth. This experiment of combining the use of plaister with enclosing has hitherto been very flattering.

As to corn stalks, for about 26 years past I have reduced all mine to food, litter and manure. But my experiments reject the use of cutting boxes, after trying the best for a long time, on account of the expence and inutility of the labour. The expence on a very small farm is not seen; on a very large one, it is felt at once. On mine, the removal of stalks, straw, corn shucks, cobs and tops to the places of consumption, is nearly sufficient for the winter's work. To cut the stalks and straw, would employ the whole labour of the farm. If a good farmer ought to have a vast surplus of dry vegetable matter for litter, beyond what is necessary for food, why should this expence be incurred? Is it not cheaper to feed in waste, and let the waste go for litter? It is with difficulty I reduce this coarse food to manure and apply it in the spring. If the stock is increased and made to eat it, the manure is diminished, and the additional stock is soon killed by the want of a dry warm bed, and a deficiency of summer pasturage.

I find corn stalks gradually became less valuable as food and litter, the longer they stand, therefore I begin to use them as soon as I begin to gather corn, by removing every day the weather will permit, about eight or ten heavy waggon loads, into the stable yard and farm pen; keeping a parcel near each to resort to in less quantity when the weather is bad. Horses and mules thrive better at this crisis, than at any other time of the year. Whether the saccharine juice of the stalk agrees better with them, or whether it is owing to their being able to masticate more of it than the cow, who is chiefly confined to stripping it, they seem to thrive better on this food than horned cattle. Between two and three thousand load of manure is made on the farm I live on,

* *Syntherisma Serotina L.*

chiefly of corn stalks. It accumulates in the yards until the winter is over, and is never disturbed until the moment it is to be used. This is always in April immediately after the corn, save what is to occupy the land to be manured, is planted. The manure is carried out, spread on land fallowed in winter, that it may separate easily and mix well with the coarse manure; a bushel of plaister to the acre is sown on it after it is spread, and it is ploughed in, all on the same day. I have frequently for experiment, left my manure longer periods to rot, undisturbed—made up into large dunghills—mixed and unmixed with earth—covered and uncovered, and in all have suffered a loss of labour and manure, in proportion to the deviation from my present practice. When manure is suffered to lie to a second year, I think its loss exceeds a moiety. The best instrument for raising and scattering this coarse manure which I have seen, is a hoe, in its eye, shape, helve and dimension, precisely like what is called here a hilling hoe, but having three strong prongs in place of a blade. These prongs pierce the manure by the fall of this forked hoe, it is taken up without stooping, in as large a parcel as the labourer can manage, and shaken into the waggon by suffering the helve of the hoe to fall gently on its top piece.

You ask me the cause of the black heads of wheat in the forward kinds I sent you. They are frequent with us. And the forward is more liable to them, than the later wheat. But in no instance have I known them to produce a material injury to the crop. The infected heads perish young, and communicate no distemper to their neighbours; and the number is never considerable. Like the rust and other disorders of that kind, I suppose it to proceed from repletion. Most of my lands being flat, I have observed that those disorders might be infallibly produced artificially, by graduating moisture alone for their attainment, and trusting to the season for heat; and the remedies I use are, to plough very deep when I sow my wheat; nevertheless covering it shallow, and to lay the land in ridges the width of the corn rows, with a deep and narrow furrow between them. Wheat seems to me to resist these maladies, in proportion to its forwardness, because it is less exposed to the combination of heat with moisture. Early kinds are the resource against the one; draining off rain water by furrows and deep ploughing, seem to me to be the best resource against the other.

A few of the experiments I have made with gypsum are mentioned, to take a chance for adding a fact to your information on that subject.

1803. March 15th. Oats and clover, both just up, plaistered them at one bushel to the acre; three weeks after, plaistered them again with the same quantity. Upon both occasions left the richest portion of the plat unplaistered. This only produced one third, both of oats and clover, of the plaistered land.

April. Mixed or rotted a bushel of plaister with as much seed corn, keeping it wet whilst planting. With such rotted seed planted a field of 40 acres, except eight rows through the centre which were unplaistered. The land poor. The inferiority of these eight rows was visible, from the moment the corn was up, to its being gathered.

1804. April. Rolled the seed corn of two hundred acres in like manner, leaving eight rows across the field, so as to intersect with flat, hilly, sandy, stiff, rich and poor land. Their inferiority was so visible, that from an eminence in the field, a stranger could point out the eight rows from the time the corn was three inches high, until it was all in tassel. In this the eight rows were a week later than the plaistered corn. The plaistered corn stood the best, was forwardest, and produced the greatest crop. Its fodder dried about ten days sooner.

1805. April. Plaistered as above the seed corn of 30 acres of rich *moist* land, leaving eight rows. Corn injured by too much rain. No difference between the eight rows and the rest.

May 7th. Replanted my corn on the high land, which had been much destroyed by mice, moles and birds, mixing two quarts of tar well, with one bushel of seed corn, and then plaistering it as above. The best remedy I ever tried against those evils, and the plaister as usual, accelerated and benefited the corn.

April 25th. Plaistered three bushels on three acres of clover just up, sown alone on land half manured with coarse manure. A good crop.

May 9th. Seven bushels on seven acres of forward wheat and clover. Wheat heading; land thin; the clover exceeded what such land had usually produced. No benefit to the wheat.

May 10th. Six bushels on six acres of very bad clover sown last spring. Clover just beginning to bloom. The season became moist, and it improved into a fine crop.

May 10th. Last spring I left an unplaistered strip of 20 feet wide quite across a field of clover. It was all cut

except this strip, which was so bad as not to be worth cutting. This spring on this day (clover beginning to bloom) the strip was still much inferior to the adjoining clover, which was good. I plaistered it at a bushel to the acre, leaving the rest of the field unplaistered. It equalled the adjoined clover in one month.

May 16th. Sowed 23 bushels on 23 acres of corn in a large field. Ploughed in part immediately, harrowed in part, and left part on the surface ten days before it was worked in. Corn four inches high. Weather moist. No difference between the three divisions. The seed of the whole field had been rolled. These 23 acres exceeded the adjoining corn 25 per cent: its blades and tops also dried sooner.

June 15th. Plaistered at three bushels to the acre a strip of goose grass or English grass—no effect on land or grass.

August 10th. Sowed 50 acres of thin sandy land in corn at the time, in clover, and 40 bushels of plaister on the seed, harrowing both lightly in. A moderate shower in four days, succeeded by a severe drought. Clover sprouted and chiefly perished. A good cover of bird-foot clover followed land so visibly improved, that a stranger could mark the line of the plaistering by the growth. That and the adjoining land in corn in 1808. The difference visible in favour of the plaistered land.

September 17th, to the 5th, of October. Sowed 88 bushels of yellow latter bearded wheat; 171 of forward, mixing half a bushel of plaister with one of wheat, a little wetted. One bushel of forward, and three pecks of latter wheat were sown to an acre. All among corn. Two slips of 30 feet each were left across the

field, in which unplaistered wheat was sown. Where the land was sandy, the unplaistered wheat was best, owing to the great growth of bird-foot clover among the plaistered. This discovered the effect of gypsum on that annual grass. Where this grass did not appear, there was no difference between the plaistered and unplaistered wheat. From the spring of 1806 to this time, the unplaistered slips have been distinctly marked, by a vast inferiority of the weeds and grass naturally produced.

November 23d. Sowed three bushels of plaister on one and an half acres of wheat, left unplaistered for the purpose in the field last mentioned, on the surface. Weather moist. No effect on the wheat, on the ground, or in the growth to this day, though the plaister was of the same kind with that used in the last experiment.

1806, March and April. Sowed 200 acres of clover with plaister, at different times when the weather was dry, moist, windy and still, part at three pecks—a bushel and five pecks to the acre, leaving a slip of 20 feet wide across a field, to ascertain the goodness of the plaister, which was of a hard white kind, that hitherto used being soft and streaked. The clover in this strip was bad, on each side of it, fine. No apparent difference was produced by weather, quantity, or times of sowing. The whole crop far surpassed in goodness whatever such lands had produced before, except the slip, as to which Pharaoh's dream seemed reversed.

April and May. Rolled all my seed corn as usual, leaving slips unplaistered. An excessive drought. No difference between these slips and the rest of the field. The following year when that grass grew, tufts of luxuriant bird-foot clover, designated the exact spots where the plaistered corn had been planted.

April 23d. Sowed 16 bushels of plaister on eight acres of oats and clover, just up, intending to have a great crop, and leaving a slip. Land naturally fine and highly manured. Drought as above, excessive. Oats bad. No difference between the slip and the rest. Clover killed. Land ploughed up in September and put in wheat. Clover sown in 1807 on the wheat. A heavy crop of wheat, clover plaistered in March 1808, at a bushel to the acre; crop very great. No inferiority in the slip unplaistered in 1806.

1807, March 1st, to 12th. Sowed clover seed on one hundred acres in wheat, and 80 bushels of plaister the sowers of the latter following those of the former. Left a strip of 20 feet. Weather dry, moist, windy or calm, and for two days of the sowing a snow two inches or less, deep, on the ground. Land stiff, rich, poor or sandy, and of several intermediate qualities. The clover came up better than any I ever sowed on the surface, the strip was a little, and but a little inferior to the adjoining clover, which I attribute to its receiving some plaister from the effect of a high wind. The whole field received three pecks to the acre in 1808, and was the best piece of high land grass of the size I ever saw. The wheat received no benefit.

March 10th. Sowed 40 bushels of plaister on 60 acres of poor land, cultivated in corn (Indian) last year, and well set with bird-foot clover, leaving an unplaistered slip. Weather dry and windy. Effect vast. Strip visible to an inch, as far off as you could distinguish grass. The bird-

foot clover died, and a crop of crab grass shot up through it, and furnished a second cover to the land.

1807 and 1808. In these two years all my corn ground as it was broken up or listed has been plaistered broadcast, with from three pecks to a bushel to the acre, and directly ploughed in, and both the seed corn and seed wheat have been rolled bushel to bushel. In both, the crops have greatly exceeded what the fields have ever before produced. That cultivated last year has doubled any former product. But they have been aided in spots with manure, and the years were uncommonly fruitful. All the manure carried out in these two years has been sprinkled with plaister when spread before being ploughed in, and several fields of the bird-foot clover have been plaistered. The results conform to those already mentioned.

1808, February. Plaistered four ridges of highland meadow oat at a bushel to the acre. No effect.

Some of the inferences I make from these experiments are, that gypsum should be worked into the earth; that half a bushel or less to an acre, worked in, will improve land considerably; that drought can defeat its effects upon corn, but not upon the land, if it is covered; that the weather is of no consequence at the moment it is sown, though the subsequent season is of great; that it may vastly improve red clover even as late as May; that it increases the effects of coarse manure; that a quantity less than half a bushel to an acre, is in some cases as effectual, as a much larger one; that excessive moisture or excessive drought destroys its effect; that its effect is more likely to be destroyed, when sprinkled on the surface, than when mixed with the earth; that

sowing it broadcast among Indian corn after it is up, may improve the crop 25 per cent: that sown in June it may not improve English grass; that sown in August and covered, it may improve the land, though drought succeeds; that sown on wheat in November, it may neither benefit the wheat nor land; that about three pecks to the acre immediately sprinkled on clover seed sown on the surface, may cause it to come up, live, and thrive better; that a similar quantity sown on the surface in March may treble the burden of bird-foot clover; that sown broadcast from the 1st of January in breaking up or listing corn ground, the same quantity will probably add considerably to the crop; and that it may not improve the high land meadow oat if sown in February.

I have witheld experiments tending to prove the utility of combining enclosing with the use of gypsum, because they are yet defective; and some others, on account of the length of this letter.

If my poor experiments can in the least degree advance the laudable design of your institution, I shall be always willing both to communicate them, and that you should either select extracts, or suppress them as you please. I expect this year to complete a project for draining 200 or 300 acres of land, subject to tide water, muskrats, and a creek having two mills on it above. It is a considerable work for a farmer, and has been conducted at very little expence. Would a circumstantial account of it be agreeable, should it succeed?

I have been obliged to use the common names of several grasses, from an ignorance of the botanical. Some of them have not I believe been named by the adepts

in that science, and I have no botanical vocabulary to look into for the others. Such names I know fluctuate and are often different, in different districts; if those I have used should be unintelligible, I will upon knowing it, try to explain them. I am with great respect, Sir,

Your most obedient servant,

JOHN TAYLOR.

DR. JAMES MEASE.

Observations on Colonel Taylor's Letter, by R. Peters.

Belmont March 15th, 1809.

Dear Sir,

I return you Colonel Taylor's letter, which I have read with the same pleasure all his communications inspire. His letters cannot be too long; I wish those of equal ability to give information (if many such there be, among those devoted to agricultural occupations) would take half the pains, either to establish facts or to communicate them. His mode of substituting the clothing of its own surface, in place of artificial, or factitious manures, is new to us, *on the scale he exhibits*. The difference of the vegetation, ploughed in dry or succulent, has always, with me, been in favour of the latter greatly. But when I compare my relatively small husbandry, with his expansive performances, over so vast a surface, I feel like a dwarf along side of a giant: conscious of some powers, according to weight and inches,—but lost in comparative inferiority. Yet, after all, the *principles* of *small* or *large* husbandry, though they may differ as to the extent of application, are the same. And my opinions, suited to my capabilities, have always been in favour of the "*exiguum colito*." I think there is more gained by it, in proportion. If I can get as I have done, from 30 to 50 bushels of wheat off a few acres—suppose 20—I gain more than the southern farmers do off 100; both in product, and saving expence. But they have slaves *individually* fed and cloathed cheaply, and paid no wages. The *drones*,—the old—the young—the

sick—the vitious—and the idle—consume, however, no small portion of the earnings of the *workers.* The latter their owners *must* employ; for the more they work, the quieter they keep them. Therefore all systems are good or indifferent, according to existing circumstances.

I have always been of opinion, and so I long ago mentioned to you as plainly *as I dared*—that your corn stalk cutter was an expensive bauble; if used on a great scale on an extensive farm. You see even the labour of slaves, is thrown away in this tedious operation. It can only be useful where forage is scarce; and labour applied when there is nothing else to do.—And when is that interval, on even a Pennsylvania Farm?

The maxim of our grazing farmers, on uplands here, is; "the more cattle, the more grass, and the more fertility." *Arthur Young* says—"the more sheep the more fertility, and supplies of food." I have never yet found this verified—*est modus in rebus—William West*, with the addition of his top dressing, went the nearest to prove it as to cattle. He bought no manure but lime, and ploughed none:—but the hoof and the tooth were in eternal activity. In no country is there finer or better grass, than constantly covered his fields.

The *bird-foot clover, eo nomine*, I do not know. But being, no doubt a variety of the *trefoil*, the plaister operates with it. Mr. *Taylor's* ideas, as to *old dung*, are similar to my own; but I have never liked applications of it in a fermenting state, in *light soils. Weeds*, Mr. T. does not seem to care about. I have been just reading some discussions, in the late British agricultural magazines They go to prove "that the heavier the

crop (no matter of what) the richer the land is left; the grain thrives best through tap rooted grass." I give this as *their idea*—for Mr. Taylor's experiment, "September 17th to 5th October" [and many might be added] disprove one, at least of their principles. The wheat was worst among the plaistered bird-foot clover ["*why.*"*] They say, that "vegetable cover excludes *heat*, and admits *light;* and these are distinct elementary substances, though generally found together. *Light*, with hydrogen and carbon (the materials of *oil)* is the vivyfying power of vegetation; but *radiant heat* is hostile. Enough *light* is admitted under the cover, and *radiant heat* is excluded." Although it cannot be denied that *light* is essential to the life and growth of plants, which can be raised to maturity in caves, by *lamp light*, it does not fertilize the soil. They do not make allowance, either, for the exhaustion of a heavy crop. What will they say to Mr. Taylor's dead cover of cedar &c; or to a door, or board, lying on the surface; and fertilizing; by preventing evaporation, and the extraction by the sun [or a crop] of what the air impregnates? And yet admitting, not *light* but, the acidified *gases*, carbon &c. which create and support vegetable

* To the "*why*" of Mr. T. I have no decisive or technical answer. *Probably*, the under crop of grass prevents from perspiration, and stagnates in the lower joints of the wheat-stalks, more juices than can circulate through the plant. There are greater demands for food, by both plants, than the earth can supply. The strongest and most forward plant obtains the mastery. Thick and strong wheat, often choaks clover. R. P.

existence. Theories sink under facts; and I depend on the latter. Young grass does no harm. But I have lost crops by plaistering clover; and throwing up luxuriant vegetation under wheat.

You must get Dr. Seybert, or some other chemist, to inform how to discover the quantity of the *sulphuric acid* in plaister. It is good or bad, according to the proportion of this acid contained in it. My way has been to heat it in a dry pot; and judge by the ebullition. But I now take it as I can get it. I find hard or soft stone very little different in effect; though it makes a great odds in pulverization. The colour is given by metals—most commonly—by iron. It is a *sulphat;*—and its distinguishing characteristic is the sulphuric acid. If Mr. T. would keep this in view, and attend to the principles I have mentioned often, both in the "agricultural inquiries" and in our memoirs, he would, with his great industry, and agricultural, as well as other capacities, help us all in developing causes. The half bushel, doing as much as any quantity, is accounted for on these principles. Our pupil will soon be our master. He wants no instruction. His facts agree with my experience, ever since *gypsum* was used here. With wheat or other culmiferous chaff-bearing crops, I never found it anywise efficient: except that rolling the seed in it gives an impetus to the first spring or shooting of the plant. I wish Mr. T. would gradually banish the heterodox custom of maize with wheat, in the same field. But the southern farmers will never listen to this *Pennsylvanianisme*. We meet the fate of all preachers against inveterate habits.

I have always found scattering plaister over the whole of a corn field, better, than partial applications to hills. Covered or not, I have not found much, if any difference. I have sowed it on the snow in February, and as late as June, or July, with equal success. Season and casual circumstances, no doubt, concurred. I should think that covering would be the best for a corn field. It brings it in contact with the roots of the plant, as they spread.

I wish Mr. T. would send us his results and mode of draining. Every thing from him is valuable.

You can easily inform him of our mode of manufacturing plaister. Nothing can be more perfect; and you know how to describe it. You may send this letter; or pick out of it any thing you please.*

I am much afraid of Mr. Taylor's experiment on his 200 acres half kept in corn—and half in ungrazed clover—both plaistered. It will most assuredly fail on the corn ground, though it will succeed on the other part. No doubt the vegetable matter in the latter, will constantly give activity and pabulum for the sulphuric acid. But what will be in the corned part for it to work on? The more pulverization by constant tillage, the less the plaister will operate; because the vegetable matter is perpetually dissipated. I have often mentioned

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* Colonel T. in a letter February 16th, 1810, to Dr. Mease, explains his practice, which had been misunderstood. It is a bold, and it is to be wished it may be a succesful experiment. The ameliorating the soil, by the decay and *accumulation* of vegetable matter from its own surface, has succeeded on a smaller scale; but in a longer time.

the fact, too, of the necessity of change of crop from the following example of its contrary; because it was very remarkable, though not singular. A neighbour of mine, rich and stiff in opinion, (and not like Mr. T. receiving graciously all information) added to my long catalogue of facts on this subject. He would not believe my doctrine (nor will many others) about change of crops. He said *dung* would do every thing. He planted Indian corn, and plaistered it for seven or eight years, in the same field. In his last effort he highly dunged the field. He saw it gradually dwindle, 'till it came to a small bamboo. It is a great exhauster, added to the other objection. He continued apparently incredulous; and thought of his field, as one in a consumption does of himself: who does not believe he is dying, though on his last legs. He changed his crop, however, from conviction: but *he said* it was "because he was tired of seeing always the same plant." He sowed wheat; and had the finest crop, he ever raised. This had the benefit of his dung; which wants no co-operator. But plaister is not a noun substantive. Nor is a plant too long kept in the same field.—Alternation and vegetable manure may favourably interrupt the continuity of crop.—A plant kept too long in the same field is not assisted by frequent repetition, or quantity, of manure. It must have a change. Gorging with dung, is as little beneficial to a plant, as overabundant food to an individual, cursed with a canine appetite. He eats much—digests little—and dies. If there is any exception, it is grass;

which, however, is always changing its species on the oldest leys, in whole or in part.*

I see Mr. T. does not approve of exposure of surface, even *in winter*. I have read and heard much, in the dispute between the *fallowists* and *anti fallowists*. The results, in my mind, have been much like many of our *public* disputes. You end with as little conviction as you begin. From long and reiterated practice for

* What *Tull's* drill husbandry may prove against this long indulged, though not singular opinion, I cannot say. The drill husbandry is much in vogue again in England; though *Tull* had been long, as sailors term it—under the weather.—I contend not for dogmas or theories. But I speak from uniform observation as *to myself*, without impeaching the experience or judgment of others. Tull's ideas were, that, by frequent stirring and culture and changing his drills, he could successfully cultivate the same plant, in the same field, for any length of time with little or no manure. There seems a *fashion* in husbandry, as in all other human affairs. It will be seen that a Mr. Gregg, hereafter mentioned, succeeded in *reversing* the culture which had been used on his farm, for half a century. 'Tis not unlikely that when he passes away, somebody will reverse his practice. It is not surprising that in smaller operations such vicissitudes should occur. In naval tactics, *magna componere parvis*, Mr. Gregg's countrymen succeed by *breaking the line*, [their own first and then that of their enemy,] though many old victories were gained, when it was *the fashion* to *keep it compact*. Their too successful antagonist wins, and desolates, *fields*, regardless of the labours of the husbandman, by reversing, or despising, all the tactics, which had given to preceding conquerors, what was once considered, deathless fame. R. P.

more than 40 years, I have invariably found *fall and winter ploughing*, and exposure to the *winter frosts*, and *temperature*, with all its vicissitudes, most salutary and profitable to all succeeding crops. To Indian corn most strikingly. In the season of winter the earth, which is more the place of deposit and store-house for the food of plants, than the nourishment and support of them in itself, receives every thing and parts with nothing. Even, *summer fallowing* for killing weeds, and opening mouths to receive the nutriment for future crops from the air, if the stirring be frequent, is highly beneficial;—though I have met with some facts which have staggered me on that point. In England, I believe, the fallowists have the majority on their side. I nevertheless, believe in all that can be said about *permanent* and long cover; and in the efficacy of covering crops. I have wrote too much now, to allow me time to give what I conceive reasons for such opinions; nor do I deny that there are some soils, which may afford exceptions. You know I do not deal in paradoxes, or fine spun theories; however these may appear. The practice of *fall ploughing* is here approved by all intelligent practical men.

The best way for colonel T. would be to try a few acres; and not speculate about it;* *not in wet clay soil.*

* "*Not in wet clay soil.*"—I did not mean to say, that, in such ground, fall and winter ploughing should be excluded. Nothing can be better if well managed; and the field thrown up in narrow ridges, to dry and drain. I have known plaister succeed on clay, when thus freed from moisture. This kind of soil has a tendency to consolidate, and bake, or harden into a crust, on the surface. And the more so, if ploughed

—One trial may not be enough, he will discover rea-

in broad and flat lands. Frequent ploughing does not seem always to answer on this, as well as on lighter soils, unless it be ridged, and thrown up to drain. I feared that, in the first essay, the proper mode would not be adopted. It is on this soil only, *in this country*, that fresh dung, can be recommended, if it be in any case preferable. *Arthur Young*, in his address to the British board of agriculture, (1809,) speaks in strong terms of approbation, of the practice of applying *fresh dung;* and quotes the authority of professor *Davy*, for its great and important efficacy, *chemically* considered. It would be well to make experiments on all soils; and obtain facts and results. *For myself*, I can answer, that on *light soils*, I have tried it repeatedly, with evident disadvantage, though I am not a friend, to over-rotted dung.

There is a communication from *Thomas Gregg Esq.* to the British board of agriculture, May 20th, 1809, of his mode of managing a farm of 240 acres: of heavy, *wet clay* land, in Hertfordshire, England. It is well worthy the attention of our farmers on such lands. Though his husbandry is on the drill system, which we are not in the habit of practising, yet much of his management might be profitably introduced.—He ploughs but once in the year. And that in the autumn and winter; and *then* ploughs in his dung, which remains undisturbed by the plough, (his allowance ten loads to the acre,) and therefore, he says, a less quantity has more efficiency. The surface is kept clean, friable, stirred throughout, and free from baking, by the *scarifier* and harrow, which prepare for, and cover all his crops; which, where they are of similar grain, are not greater, to the acre, than our own, with good farming. Of the instruments, plates are given. The *scarifier* is not unlike my *cleaning harrows;* but more adapted to his use. Mine are for lighter work, in loamy soils, with only one wheel, in the beams by which they are drawn, to regulate

sons, by facts. And no one can turn them to better ac-

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depths. I can multiply or diminish the number of *hoes* at pleasure; and work them at two, three, or six inches deep. I have them with three, and as far as twelve hoes, of different sizes, to stir from two to three and four feet in breadth. Of Mr. Gregg's crops, there is a constant succession, so that his ground is never naked, and exposed to exhalation and exhaustion, by the sun. Before ploughing, he uses a *marker* to trace, or lay out his field; so as to be ploughed in five and a half feet ridges, with a drain between them. His whole admirable economy, rotations, and changes of crops are detailed. He has cleared annually, £ 1117 11*s*. Sterling on an average of six years: whereas it had cleared before his taking the farm only £ 230, annually. He *reversed* all the old *regime* of this farm, under which it had been managed for 50 years. Including £ 240 rent, his annual expence is £ 1367 9*s*. Sterling; $ 6071 48 cents of our money, which would buy here a good farm.

But it is well worth the notice of an *American farmer*, if he should complain (as is often the case) of *his* public burthens—that Mr. *Gregg's* tithe is £72, his *poor rate*, £60, and his *highway duty*, only £ 6—being an annual incumbrance, beside imperceptible taxes of £ 138 Sterling,=613 dollars of our money.—And *tithe*, *poor rate*, and highway charges were the same, when the produce and profits, were at the lowest rates. Their turnpikes and canals, very numerous, supersede the necessity of high road taxes. An example which is laudably operating on us.

English farming requires to be in a superior style, to afford its annual burthens. But these stimulate exertion, and call forth the powers of the mind, as well as corporeal employment. I wish no such stimulants here; though of taxes for the poor fairly entitled to public support, and for making and repairing roads, if justly applied, no complaint should ever

count; I wish I could get such a person as Colonel T. to establish in his own *domain* a little *pattern farm;* where he could (as *he* would) pursue, on a small scale, the best systems of neat and improved husbandry. This would be a *school* and example, for his own benefit, and great amusement; as well as for imitation by his neigh-

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be made. It is probably, however, owing to the ease with which our wants are well supplied, and a competence obtained, and, of course, so few paupers, and all taxes light, that our agriculture is not better. We do not feel that necessity, which is not only the spur to exertion, but, according to the trite adage, the mother of invention: we are assuredly advancing, commendably and profitably, in most branches of our husbandry. Long may we continue to possess the salutary and substantial enjoyments derived from it! Obtained, 'tis true, by an inferior style of cultivation and economy; but without the painful feelings, which not only the amount, but the *subjects*, of *two* of these heavy annual contributions, would excite.—Not because the ministers of religion should be destitute of decorous and plentiful support; or the poor be comfortless, or ill supplied. But because we are accustomed to choose our own pastors; and take our own modes of supporting *them* and no others. We have not the numbers of poor, in proportion to population, to demand such contributions, or afflict our sympathies. *Wars*, either of necessity or ambition, or too extensive manufactures, have not yet withdrawn our people from extending the cultivation of our soil, however inartificially; nor most deplorably increased, the numbers on our poor list. Should it ever happen that these consequences attend manufactures, it will be a warning that they are carried too far.

R. PETERS.

bours. His slaves might here be taught, by selections; and when taught, turned on his common farms, improved in themselves, and exemplary to others. But the southern gentlemen object to mixing slaves of different habits together. It has I believe, never been systematically tried.

Yours very truly,

RICHARD PETERS.

Dr. JAMES MEASE.

I think the *magotty bay bean* operates like Mr. Taylor's bird-foot clover, in some respects. It fertilizes by cover, and rotting down its vegetation continually. It seeds plentifully; and renews itself constantly. For light sandy soils it has been much used in Maryland; and elsewhere. But it is only fit to prepare for grain crops; which it wonderfully assists. It excludes clover and other grasses, by keeping the sole possession of any ground it once fully occupies. Being a legume, it does not exhaust. We have tried it some years ago; but disliked it, as being injurious to the clover system. Cattle and sheep feed on it: and it is good where nothing better is to be had. It grows on light and barren soils, where better products will not thrive.

R. P.

On Gypsum.

Read June 13th, 1809.

Virginia, Port Royal February 10*th*, 1810.

Dear Sir,

Both Judge Peters and yourself have mistaken my experiment, respecting a field in corn, and another in bird-foot clover, owing no doubt to the obscurity of my language. These fields are not permanently occupied by either plant, but alternately by both. One field produces a crop of corn, and the other being enclosed, receives the benefit of a crop of ungrazed vegetable matter. The succeeding year the ungrazed field is taxed with the crop of corn, and the corn field fed with the ungrazed vegetable. Both fields receive annually a bushel of plaister to the acre; in one it is sown upon the bird-foot clover in March or April, and in the other ploughed in at its fallow. The object is to ascertain whether an annual bushel of plaister to an acre, combined with a biennial relinquishment to the soil of its natural vegetable product, will enable it to be severely cropt every other year without impoverishment, or with an addition to its fertility. The first effect would suffice to check an evil, every where demonstrating the wretched state of our agriculture; the second would be a cheap and expeditious mode of improving the soil, even where the state of agriculture is good. If doubts had not been again excited by the seasonableness of the last year as to rain, my convictions would have been settled

both as to this experiment, and also as to the efficacy of plaister. The trial corn field produced double its customary crop. Near 300 acres in corn on my farm, not twenty of which were manured, almost averaged thirty bushels. A double crop also. But I shall record and transmit to you the result of a more complete trial. In the mean time, Mr. Roberts's experiment* so accurately accords with my observations and hopes, that it affords me much encouragement.

The progress you are making in the improvement of sheep, is at present the first object of public interest, but it will not be speedily, if at all, that the country below the mountains south of the Susquehannah will rival you. We have here neither buyers nor manufacturers of wool, (the household excepted) of any moment. Its usual price is about 17 cents, and we cannot grow it in our dry climate on exhausted lands, at less than double the price you can afford it at. These considerations shew you that success does not yet appear to us through the magnifying end of the telescope.

The perusal of Judge Peters's letter has afforded me great pleasure.

Of sundry suggestions in his letter I shall certainly avail myself. As to a few, my doubts remain. The maxim "the more cattle, the more grass" may be thus conjugated. "Cattle produce grass—grass produces cattle—and cattle will subsist men; and so the system of Malthus is overturned, more easily than the system of Malthus overturned the system of Godwin."

"The heavier the crop *no matter of what*, the richer the land is left, *though the crop is taken off*." From this fact stated by judge Peters, I infer, "that the heavier the crop, *no matter of what*, the richer the land is left, *if the crop is not taken off*." If a heavy crop of weeds or crab grass (no matter of what) would leave the land richer though taken off, it will I suppose enrich it still more, when restored to the earth. By the fertility of the surface of the earth of uncultivated countries, and of long enclosed spots, our attention is drawn, to vegetable matter. The famous experiment of the willow, with many others, proves that vegetables draw much of their food from air and water. Whatever of these transient elements, vegetables can catch and bestow on the earth, elaborated into a durable manure, seems to me to be a particular acquisition drawn from an inexhaustible treasury. It is however, not the small neat husbandry of which the judge is so justly enamoured, and which may be preferable in well peopled regions, but one calculated to improve a great space of worn out land slowly and at small expence. Weeds and grasses of all kinds undoubtedly injure the crops with which they grow, yet we sow clover with wheat. In seasons favourable to its growth, I have seen it injure wheat materially. It is for the purpose of replenishing the earth with vegetable matter that we do this. The stubble and roots, the litter it produces or saves when fed away (such as straw and stalks) conspire to furnish the recruiting pabulum. Weeds and grasses of all kinds left on the surface or ploughed in, like wheat straw, are supposed by the en-

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* A mode pursued by Job Roberts, on a particular worn out field, had been stated to Mr. Taylor.—See Robert's Pennsylvania Farmer, page 208.

J. M.

closing system to afford this pabulum; nor will they prevent a clean culture, if their vegetating periods are attended to. Is it certain that an annual plant sprouting late in the spring, and suddenly covering the earth after wheat is reaped, may not be made as useful as a perennial one?

The object of a pattern farm mentioned by Judge Peters, is the exact object to which I am aspiring; but it is pursued rather on a large than a small scale, because it is necessary to combine considerable profit with the experiment, for the subsistence of my family; to face the objection that my system is fit only to create a pretty garden at great expence; and to allure men by exhibiting the most powerful temptation in my own actual success to imitate the example. A draining experiment upon the point of being finished, will soon develope it in all its parts, and if it should then satisfy my own judgment, and meet with the approbation of others, I will give you the best account I can of such items as may be embraced by the design of the society.

I am very respectfully, Sir,

Your most obedient servant,

JOHN TAYLOR.

DR. JAMES MEASE.

On Fruit and Fruit Trees.

Read June 13th, 1809.

Stockport, Wayne County, April 5th, 1809.

For the Philadelphia Society for promoting Agriculture &c.

Gentlemen,

It is with pleasure that I see your publication* of the 21st, last Month, requesting answers to sundry queries respecting the cultivation of fruit trees.

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* The following publication is alluded to:

The agricultural society of Philadelphia, desirous to collect facts on the subject of *fruit* and *fruit trees*, will be much obliged by answers to any or all of the following queries. As their object is to obtain and promulgate information relative to fruit and fruit trees, the best adapted to our climate and circumstances, they hope those of their fellow citizens, who have experience in their culture, will favour them with their assistance in a design of general utility.

1. What kind of fruits are the greatest and most certain bearers?

2. Which are those coming soonest to perfection, and times of blooming and ripening of those within your knowledge?

3. Which are the hardiest, and most easily propagated; and the different modes of culture; and the times and manner of planting and propagating, both as respects season and state of sap?

And as you justly observe, it is not expected that one individual may be able to answer all the queries; perhaps it may also on the other hand be difficult to pro-

4. What enemies assail fruits, and modes of destroying them, or guards against them?

5. Modes of recovering decayed trees, which are most subject to injury, and the best means of preventing diseases or decay?

6. What soils, and what manures or dressings are proper for the respective kinds of fruit trees, and their proper aspects: in what situations do they thrive most, and what are general causes of injury or decay?

7. What trees require the tree-knife, and which are best left entirely to nature?

8. What fruits will bear gathering before maturity, so as to ripen in the house, or under other cover; and the best mode of preserving ripe fruit for use?

9. What insects or vermin are enemies to fruit, and the means of repelling, or destroying them?

10. How long since the bitter-rot first seized the Vandever, and house apples? Is there any mode of prevention, or has situation or soil any influence on the disease?

11. Apples generally fell off the trees in great numbers before maturity, last autumn near Philadelphia. In many no mark of decay appeared. What is the cause of this early falling and what the means of prevention?

It not being expected that any individual will be enabled to answer all these queries, it will be seen that it is left to each correspondent who will be pleased to attend to them, to give information as to that species within his knowledge. Communications to the secretary of the society will be gratefully received.

pose queries, the answers to which, would include all the useful information the subject would admit.

For upwards of the last 30 years, of my life, I have taken great pleasure in paying attention to the raising of fruit trees; and if any observations that I have been able to make, prove of service to my fellow citizens, I shall have a pleasure in communicating them.

I shall not attempt a regular answer to your queries; yet pay some regard to your arrangement, confining myself principally to the *apple tree.*

I consider the *apple* the greatest and most certain kind to bear; yet not raised so soon as a *peach tree* by perhaps 10 years, before they produce much fruit.

I consider apples under all their varieties, the length of time they may be preserved, and the many uses made of them, not only the most valuable of all our kind of fruits; but perhaps of more real value to the people in general than all the other fruits.

The apple is the hardiest kind of fruit tree, and the easiest raised of any that I am acquainted with; yet perhaps they require the most time to raise.

I have planted several orchards, and have not experienced any material difference in my success as to their growing well; whether planted in the fall or spring, or at any time in the winter, provided there is no frost in the ground: I believe any time when there are no leaves on the young trees, will answer equally well to plant them.

This idea of transplanting fruit trees at any time when they are destitute of leaves, is not an original discovery of mine; but was communicated to me by let-

ter, many years ago by the learned and ingenious *Chancellor Livingston.*

The greatest enemy to fruit trees in this part of the country, is the *catterpillar.* My mode of destroying them is to go early in the morning, and twist their nests out of the trees with a stick or pole, which I find is readily done; and that it is negligence or rather laziness in a farmer, to suffer his orchard to be much hurt by catterpillars.

The *loose gravelly soil,* I consider from all my observations, best suited for an apple orchard; and that a high and *airy situation* produces the largest fairest fruit.—A north aspect is most secure from the late frosts in the spring, as the trees do not come forward so early.

The best manure that I have experienced for the apple tree, is *horse dung and litter,* to keep the ground round the tree loose, and free from sod.

I generally prune all my kinds of fruit trees: whether any kinds answer better without, I have not experienced.

I have been acquainted with the bitter-rot in *Vandevers,* and some other apples for at least 40 years, and have endeavoured to discover the cause and prevention, which I considered that I had done, as follows.

I had observed that rot to prevail most in wet damp seasons, and on trees with the thickest closest tops and least exposed to a free air.

I considered it a kind of mildew or mould, that penetrated the skin of some kinds of apples more than others; as I have discovered on the skin of other kinds of apples *(when that rot prevailed)* large black spots.

If such was the real cause, then perhaps the pruning the trees, or raising them in dry airy situations, would be of advantage.

But about this time last year, two very intelligent gentlemen from near Boston, lodged at my house and among other topicks of conversation, those of orchards and the bitter-rot were introduced.—One of them informed me, that he had discovered "the true cause of the bitter-rot, and a safe and easy mode to prevent it;—that it was occasioned by a certain kind of a worm on the body of the tree, between the wood and the bark; and that a safe and easy mode was to peal all the bark off the bodies of the trees, on the longest day in the year; which he said he had frequently done: that it did not kill or injure the trees, but that they grew much better for it;—and that it effectually prevented the bitter-rot."

I was surprised at this account, as I had no idea of a tree living with the bark peeled off, in the hot dry season, yet they appeared worthy of credit.

Therefore I resolved to sacrifice one tree to the experiment, and on the 20th day of last June, about one o'clock, in hot clear weather, I pealed a tree on which there were apples, and had been subject to the *bitter-rot.* I took all the bark off from the roots to up among the limbs, fully expecting in two days to see it withered and dead,—between the wood and bark I found many of those worms, and discovered that there was a *pulp* or *glutinous substance* which had grown that year between the wood and the bark, and adhered to the wood. I went faithfully every day to see my *tree wither,* but was disappointed; it appeared to grow and thrive the better,

and this glutinous substance to harden, and has since grown into a *perfect bark*, the apples hung on as the other trees, and no *bitter-rot* on them as had been some years before.

I relate the facts as they are, and hope that others of more knowledge and judgment, may improve on the experiment. I intend myself to make further trials.

These facts I communicated in a letter to my worthy and ingenious friend *Doctor B. S. Barton*, and gave it as my opinion, that the annual growth of the tree at that season is of such an age, as to be in an *optional state* to either form *wood* or *bark*, as the necessity of the tree may require; how much earlier the operation ought to be performed in more southern climates, must be tested by experience.*

I have lost several good trees by those worms;—they first kill the bark, then a speedy rot takes place in the wood, and they blow down with storms: and according to my observations, all trees in a declining state are much more subject to the *bitter-rot*, than those in a more flourishing condition.

Some experiments and observations I have made in regard to raising orchards and preserving of apples, I presume may prove worthy the attention of the public.

The common practice in raising apple trees is to graft or inoculate them when small in the nursery near the ground: this does not appear to my experience to be the best way, as I have two large orchards of trees raised in that way, bearing the best kinds of fruit, and

* See Medical Repository of New-York, vols. 3d, and 4th, for an account of the utility of barking fruit trees.

J. M.

I observe that such trees only bear fruit every other year; and then generally more full and heavily loaded, than the natural strength or substance of the tree can bring to full size and maturity; and such trees when so heavily loaded, are subject to split and break down in storms.

The next year the orchard if ever so large, produces very little fruit;—the trees appear to be exhausted, and on the decline;—too great a load of apples also inclines them to the *bitter-rot* and other defects.

I have found it by experience to be a much better way, to let my trees grow in the nursery and plant them out as natural fruit;—then when they begin to bear, I go round in the fall and mark such as I disapprove of the fruit, and graft them in the limbs the next spring; and such are the best and most steady bearing trees that I have: they produce a reasonable equal quantity of apples every year, and much larger and fairer than such trees of the same kind of apple, that irregularly bear every other year.

Another advantage by this mode is, that we are still obtaining some new valuable kinds of apples, and when we graft them regularly in the nursery, perhaps often cut off as good or better fruit than we place on.

All our very best kinds of grafted fruits were originally *natural*, and perhaps if this mode was more generally pursued, many more new and valuable kinds would be discovered.

Perhaps one of the very finest and most useful apples that we now have, is the New England *seek no further* (so called;) the original tree I am informed, grew up in

a fence row, and first began to bear during the American revolution.

The best mode that I have experienced to preserve winter apples, is to let them hang on the trees as long as safe from frosts; in that time such as are most forward to rot will have generally fallen off; then to gather them carefully without bruising, and spread them for some days, to dry thoroughly, in an airy chamber:—then carefully assort and pack them in casks in a cellar, where they will not freeze:—in the spring after the freezing weather is past, spread them again in the chamber, and let them have plenty of air; during the time the apple trees are in blossom, they will rot abundantly more than at any other; and must often be carefully assorted and spread very thin: such as survive this their *probationary period*, until after the fall of the blossoms, incline to wither a little, and keep without much more rotting.

I have had some of my finest and largest New England *seek no furthers*, sound and delicious on the 15th of September;—at which time the same trees on which they grew, were again loaded with another crop of the same kind of apples, sufficiently grown and matured for common use.

Thus with care and attention, the American farmer may supply his family with green apples every day in the year.—I have done it on this farm, where about 20 years ago, I cut down the first tree.—Most of the farms through the country, abound with great numbers of scrubby natural apple trees around the fences, which the owners consider of little value; were they trimmed up, and grafted, they would be of great value, and bear

as good fruit in three or four years, as any new trees that would require 10 or 12 years, to raise.

If an accidental discovery which I think I made last spring, upon full experiment, prove as efficacious as it appeared to me, it will be worth a million of money to the union; it is to prevent the late frosts in the spring from killing the apples when the trees are in blossom.

Last spring I sowed *plaister of Paris* under some of my apple trees; when in blossom, there came a severe, late frost, that nearly killed all my blossoms, unless on the trees where I sowed the plaister, and they alone hung full of apples in the autumn.*

It is a well known fact, that plaister has an attractive quality, and draws the moisture out of the atmosphere; as on grass or grain, where it is sown, there is a much heavier dew, which remains longer in the day than where none has been strewed.

If such is its quality to attract moisture from the atmosphere, why not the particles of frost from the blossoms on the trees?

I wish to recommend the experiment to all farmers, who wish to preserve their fruit from the danger of *late frosts*.

You mention that last season the apples near Philadelphia fell off the trees prematurely; I had not known

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* This fact has been observed by others; moisture will keep off frost, common salt has had this effect, when scattered round trees. A straw rope, with one end twisted round the fruit tree, and the other immersed in a tub of water, conveys moisture and repels frosts.—See Anderson's Recreations, vol. 1st, and Domestic Encyclopædia, Am. edit. art. "Frost."

before, that the circumstance had been noticed by any person except myself. My apples most generally fell off in the same way before they attained maturity: on examining them, they appeared sound on the outside; but on cutting them open, there was a dark soft streak in all such as had fallen off, some depth within the skin; which soon turned to a rot: this led me to gather such as had not fallen off the trees, sooner than I otherwise would; I took all my former precautions to save them through the winter but in vain, they all rotted before spring; the decay began in the same dark streak below the skin.

It is a singular circumstance which I have not known before, neither can I account for the cause, unless something singular in the season.—I wish to hear the sentiments and observations of gentlemen in different parts of the state, on the subject.

I consider the best mode of raising fruit, particularly apples a primary object for our citizens in general, and as knowledge on the subject can only be obtained from observations and a communication of sentiments from different parts.

I am gentlemen

Your friend respectfully,

SAMUEL PRESTON.

Dr. JAMES MEASE.

On Apple Trees and Grafting.

Read November 9th, 1809.

Stockport Wayne County, August 22d, 1809.

Respected Friend,

Thy acceptable favour of the 26th June last, came duly to hand; the various cares of a large harvest, and this very uncommonly wet season, hath diverted my attention from a more timely answer.

My only object in corresponding on the subject at this advanced period of a laborious life, is to endeavour to afford some hints and observations to be improved upon by others, for public benefit.

American agriculture I consider as yet in the cradle: and perhaps *horticulture* or the raising trees hath been the branch most neglected, although deemed an honourable study amongst the ancients: we read that *king Solomon* when in his greatest wisdom and glory, "spake of trees from the cedars of Lebanon, to the hysop that springeth out of the wall."

Chronologists suppose *Homer* to have been much older than Solomon, and in the most beautiful episode of all his works, when Ulysses went to make himself known to his father, Homer describes the venerable old king Laertes, busily employed in cultivating his trees. The fertile genius of Homer on this occasion, had a free and full choice of all kinds of employment for the ancient

king. Yet he chose the cultivating of fruit trees as most honourable.

Then why is the subject so much neglected in our young and rising empire; the sinews and wealth, if not support thereof, is agriculture or cultivating our mother earth, and such was the first employment of original man.

I consider that he who raises a valuable fruit tree for the benefit and repast of succeeding ages, erects an honourable mausoleum to his memory.

I am free to say, that I fully believe the *apple tree* to have been a native of America, well known and used by the Indians before the discovery of *Columbus:* this idea may perhaps be new to many, and I think worthy of the most accurate investigation; and perhaps in this age since the decease of the original settlers, may be more difficult to ascertain: the longer therefore the subject is delayed, the greater the difficulty, and I feel a kind of American desire, to have it fully investigated before our present more aged citizens depart.

I wish to give a candid statement of facts that have come to my knowledge, to shew why I have formed the opinion of the apple tree being a real native of America.

I was born and bred in Bucks county in this state, and almost fifty years ago, I remember the far famed *Townsend apple tree;*—it was then by far much larger in diameter, height, its limbs extended further than any apple tree that I have ever seen:—at the time of my acquaintance with it I was young, and used to pass near it when going to mill, as it stood alone in a field.

Perhaps it is now near 40 years since I saw that tree, in which time so many objects have floated in succes-

sion before my mind, that I cannot rely on my memory to give an accurate account of its dimensions: but think from the best of my recollection, that it must have been upwards of four feet in diameter; the quantity of apples it bore, was enormous, perhaps too incredible to relate; it stood on a high airy situation, *and in a light poor stony soil;* which I consider most favourable to the longevity of the apple tree: the size and colour of the apples nearly resemble the vandever;—they are neither sweet nor sour, but of a most delicious rich taste and high flavour; easy to bake or cook; they ripen in a peculiar manner, some very early, and then drop off; while others succeed them, and at my father's, we have kept some of the later growth until apples came again, the next summer.

The proprieter of this valuable and useful curiosity, was one *Stephen Townsend*, an aged amiable and benevolent man; the tree stood near a public road, and all travellers had free access: I remember hearing him say, that when his *grandfather* first took up that place, it was a very large *apple tree* standing in an *Indian clearing;* his grandfather was *Richard Townsend*, mentioned in *Robert Proud's* history of Pennsylvania.

I also remember when very young, to have heard some of the most aged respectable, and informed people the neighbourhood afforded, say, that tree must be much older than *Columbus;* that was before I knew the meaning of *Columbus;* the proprietor *Stephen Townsend* freely permitted access to his tree; by all descriptions of people: and it was most highly esteemed, more particularly by the friendly *Indians*, many families of

whom then lived in the neighbourhood; they used all to frequent it and carry off blankets full of apples.

A very aged *Squaw* amongst them who from seniority was deemed either their *priestess* or *queen*, quite gray headed, and who pretended to remember *William Penn*, used to say, that when the Indians sold their land they did not sell their good old *apple tree*, therefore they claimed the apples, and had no opposition from the proprietor; the Indians almost worshipped that tree, and I remember hearing the aged squaw say, that when the "*Great Spirit* made that apple tree for poor Indians, he made the apples ripe all summer;"—they had a tradition amongst them, that the tree was older than the *European settlement*, and I am fully inclined to believe their ideas correct:—sometime past I was informed by a friend of mine living near where the tree stood, that it became hollow, and hath been dead and gone for some years past; my worthy father taught me before seven years old to graft an apple tree, which art I have practised very largely, being the only person within 50 miles round that understood it, and have taught it to many people in this country.

The first pence I ever earned when young, was by grafting apple trees for our neighbours; I then took grafts off the far famed *Townsend tree:* since I raised trees in this country from the seeds and began to graft, my greatest desire was to obtain grafts of that kind. I therefore wrote to a much younger brother living in the neighbourhood to make all diligent enquiry through the neighbourhood for a tree of that kind, he did so, and found one which the owners assured him was the real kind, yet it was on the decline. This confirms me in thy

idea, that a graft from an old tree makes a short lived tree. However late in the season, he sent me some cions, and I proceeded next day to graft them, all of which grew and are yet growing; they have for several years borne apples, and are the *genuine* ancient *Townsend apple*. I graft from them every year, and had intended to do it before I received thy kind information, lest that valuable kind of apple should again be in danger of being lost.

My second reason for thinking the apple grew spontaneously in America, is, that the next largest apple trees that I ever saw in my travels, was on the old Indian settlements in Menesink above the blue mountains, viz. at *Nicholas Depuis*, *Paquarry*, *Shappanack*, and several other old towns.

John Lukens, the former surveyor general, under whom I acted as deputy, near the latter part of his time, made an enquiry of me respecting the large old apple trees in Menesink opposite *Depui's* large island, and I well remember, he said, that when a small boy, he accompanied Nicholas Scull there to make the first surveys above the mountain:—and that *Nicholas Scull* admired the very large and ancient apple trees, and then gave it as his opinion that they were much older than the European settlements, as there were none in all the vicinity of Philadelphia near their age or size.

The observations of men of such sense and understanding as Nicholas Scull and John Lukens, are certainly worthy of weight.

I also remember that Nicholas Depuis Esquire deceased, the former proprietor of those ancient trees, expressed to me as his opinion, that the native Indians

must certainly have understood either grafting or inoculation, long before the white people came among them;—as seven of the largest and oldest trees on his farm standing compact together, all bore the same kind of apple; and he then considered those trees far older than the European settlement of America.—I well remember the kind of apple: they were very excellent, a large long red delicious winter apple;—I believe that those trees are now all decayed and gone.

Another reason why I consider the apple tree spontaneous to this country, is, I have seen apple trees said to have been imported from Europe, by the first settlers, not as large or of as old appearance as those mentioned, by several generations of trees.

As I have had great experience in *crown grafting*, and consider it far the most valuable mode of propagation, I will offer a few remarks.

The season I prefer, is late in the spring, but before the sap starts to loosen the bark, yet I have several times practised it with success, after the trees were fully green; but in that case, care is required not to loosen the bark.

In regard to binding up my graft, I use nothing but simple potter's clay, well worked, of which I put on plenty, and endeavour to press it round the stock below the split, so as to be water tight and retain all the sap that issues from the stock to nourish the graft.

The stocks often split rough or with a twist; my practice is to shave them out smooth with the point of a knife, that the sides thereof and the graft may make a joint.

In cutting grafts off a tree, I prefer taking one only of each limb, that is that I may have the bilge or joint between the two years growths, to shave and set in the stock;—that bilge is curly and porous, more readily catches the sap from the stock, and I find by experience will grow more the first season than any other graft taken from that limb; if there is no such bilge or joint on my graft, I shave it with a bud outward, that there may be a crook in the sap of the graft, more certainly to catch the sap of the stock: by observing these simple natural rules, I have set in one season upwards of 400 grafts, and not had more than two to fail;—and have also readily instructed many people ignorant of the business.

In grafting peaches, cherries or plumbs, in all which the outside bark of the stock runs round, there is another caution necessary in the splitting the stock, or the bark will tear rough and the graft die; that is, to enter the knife in the top of the stock, so far as to just strain the bark but not to tear it, I then take the sharp point of another knife, and split the bark down on each side the stock, just where I expect the stock to split, then proceed exactly as for the apple, and I find them to grow equally certain and well:—my apple grafts set in the limbs of trees generally bear the third year; I have several times for experiment taken grafts at same time, off bearing trees, and off grafts that had been set the year before of the same kind of fruit, and grafted them the same day in different limbs of the same tree, and cannot discover any difference in their time of bearing;—yet some kinds of fruit do not bear as early as others.

The best time or mode of cutting or transporting of grafts a great distance, is a subject worthy investigation: I have made a variety of experiments, and the result rather bewilders me than otherwise, I will relate some facts and desire further information from those of more knowledge and experience.

1st. I have frequently had apple grafts sent to me during the winter, from different parts of New England; my practice hath been on receiving them, to lay them on the earthern floor of the cellar,—cover them with earth until grafting time, and they have always grown well.

2d. Some years ago, I received in the latter part of winter, some plumb grafts (from Esopus) that had actually been imported from *Holland;* they appeared perfectly dry and dead;—I buried them in the cellar, grafted them in the spring, and they all grew, and bore fruit the third year.

3d. Several years ago I was from home, and calling to see an acquaintance, he informed me, that he had some grafts in his nursery of the French *pomme roi* or king apple, which an acquaintance of his in *Rhode Island* had imported from the *south of France;* I was anxious to obtain a cutting; it was then the 15th day of September and dry warm weather, he gave me a twig, about nine inches long in full leaf; I returned home two days journey, with it in my pocket; when I reached home it was withered, I laid it on the grass in my garden, and turned a sod over it; there it lay until grafting time, I then took it out, cut it into six short pieces, set them, and they all lived and bore fruit the third year.

4th. I was in *Lancaster* about the 10th October, and obtained some valuable cuttings from my friend Timothy Matlack Esqr. I took them home carefully, and laid them under a sod, as I had done the *pomme roi:* at grafting time I took them up, they all appeared rotten in the bark, and I could not prevail on one to grow.

5th. The grafts of my Townsend apples were cut and sent me in the month of June, after the leaves were nearly of full size; they were withered in conveying upwards of 130 miles; I grafted them the latter part of June in trees in full leaf, and yet all grew and are yet growing.

6th. In June last year, for experiment, after the leaves were about fully grown, I cut off and grafted a large tree in the limbs, taking my grafts out of the orchard also in full leaf: I had 11 stocks, and set 22 grafts, of 22 different kinds of apple; and never had grafts to grow better.

7th. About the middle of last March, I was in the city of Albany, and called on my friend Peter Yeates Esquire, for a variety of cuttings from his far famed fruits: he gave them cheerfully, I wrapped them up in the most careful manner, took them home, and buried them in my cellar as formerly; at grafting time they all appeared to be decaying under the bark, I set them with all possible care, but only succeeded in two apple grafts.

As to this season it hath been the most cold and wet ever known; attended with heavy fogs and dews: our grass and oats grew very large; wheat better than we expected: of Indian corn I presume there will be none to ripen, and even plaister of Paris would not bring it forward.

My apples are nearly all blasted and fallen off, not with frosts but cold wet rains; some I observed fell off before others, according as I presume to the delicacy of their constitutions; my *pomme roi* fell first.

Those that hung best were the New England *seek no furthers*, and the noted *Townsend apples;* can this be owing to their being natural fruit of the country?

I am respectfully your friend,

SAMUEL PRESTON.*

* Mr. Preston having had great experience in orchards, we give publicity to his information with pleasure. We cannot accord in his conclusion, though the facts of longevity of the old apple trees are curious. The *crab apple* alone we believe to be a native. There is no trace in our forests of other apples; which are found always *in settlements*, either of the Indians, or their successors. The *peach* though called *persica*, from its being brought from *Persia* into *Europe*,—we believe is also a native of the southern regions of our continent; where it is found growing wild and spontaneously in great varieties in the forests; most commonly near streams, the sea, or great waters.

We by no means make the assertion; but it would not be a more visionary conjecture, that, if the apples mentioned were not imported by Europeans, they might have been brought from *Tartary*, or those parts of the other continent from whence our aborigines wandered. The facts are too isolated and few, to draw from them any solid conclusions. The *pyrus malus*, or apple, as we see it in our orchards, is said, by botanists, to be an improved variety of the *crab* or *wilding*. Accident may have produced some, and careful cultivation others, of the 40 or 50 varieties we possess. But that

N. B. The appearance of the apple trees that I totally stripped of bark last year, is not such this summer as to encourage me in a large practice; yet they are both growing, have apples on and a new bark, but the leaves are more of a yellow than the other trees. I have freely devoted them for a fair experiment, and shall watch them closely.

I have seen in a New York newspaper, an imperfect advertisement of a book, teaching a sure and easy mode to make the limbs of the apple tree grow as certain as a tree with roots.

If this discovery hath really been made, I consider it the most valuable of any of the present age.

S. PRESTON.

such accidents here, or cultivation in the hands of our savages, who have not multiplied instances of skill in that way, in other parts of our continent, have produced the species mentioned by our correspondent, we are not disposed to believe, without farther proofs than those he has (not uninterestingly) exhibited. There is, nevertheless, no *impossibility* in the circumstance. We have the *crab* or *wilding*, in as great plenty, and variety, in its native character, as can be found in any country. Perhaps the novelty of the suggestion, may operate on our doubts. We shall be obliged by information of any other facts, if any there be, on this subject, from other parts of our country.

On Virginia Husbandry.

Read August, 1809.

Dear Sir,

Agreeably to your request I embrace my first leisure of acknowledging your favour of the 22d. of February, and replying thereto as the various subjects occur. First, you mention plaister of Paris, of which I do not make general use, particularly on my low lands, where I have not found it to succeed. I sometimes use it on my highlands, where it answers tolerably well particularly with clover, though I do not cultivate this crop upon a large scale, yet I have some at each of my farms for the purpose of feeding it, when half cured, to my horses, and other work team, through the summer.

My general rotation of crops is corn and wheat, the latter succeeding the former, on the same field, the size of which varies of course according to the size of the farm, for some of the fields or shifts as they are termed here are four hundred acres, whilst others are no more than one hundred upon the different farms, the number of shifts which is generally three, depends in some measure on circumstances and cultivation, as also depends the kind of plough; of late I have been in the habit of making mixed crops, corn, wheat, tobacco, cotton, oats, rye, pease, beans, &c. I seed from three pecks to a bushel of wheat to an acre, and reap from ten to fifteen bushels, and my corn ground produces from three to six barrels per acre, though this again is variable. according to soil and seasons. I have never yet made any

accurate estimate of the expence of timber fences, meaning sawed post and railing, which I have had for some years back, and I am highly in favour of, for though they come high in the beginning, yet I think them the cheapest in the end, as I suppose with tolerable care, they would last fifteen or twenty years. The staking and wattleing is also an expensive fence, but looks neat, and is of considerable duration, say from six to ten years, when well done with trimmed cedar brush, or cedar poles interwoven on the stakes; which last kind of fence I have of late been in the habit of making.

The cedar succeeds tolerable well here, though we have not yet any live fences in this vicinage. The stock on my farms are, cattle, sheep, and hogs, though the former succeed tolerably well, I think the latter does best. As I generally kill on my estate, from fifty to sixty thousand pounds of pork annually. The hogs are penned, and fed on corn and vegetables, for six or eight weeks before the killing season. We have an abundance of native manure, in our low ground-marshes, yet such is the routine of my cropping, the extent of the farms, and certain hands appointed to each, I cannot find leisure or means to collect it. I make no artificial manure, except what is made by my cattle in farm yards, which I keep highly littered with straw, marsh hay, corn stalks, &c. through the winter, and spring, and during the summer I have moveable pens, in which I put my cattle at night; these I generally place on my light lands, by which they shortly become equal to those of superior native quality. Our pastures are not sufficiently luxuriant here to make grazing for market an object; yet I have always tolerable good grass beef in the fall, which is

rarely sold, but distributed among my overseers, and people: that which comes to my own table is stalled for a few months, and fed with corn-fodder, (corn blades and tops,) clover and vegetables. We have but few instances of the hollow horn here, though immediately on the south side of Rappahannock, there is a distemper the nature and origin of which is not yet known, and proves very fatal to cattle. On my plantations generally, I work horses, oxen and mules; the latter, which I greatly prefer, are by far the most numerous, the oxen that are used for heavy burthens, are worked with a common yoke and bow; the few that plough work in a collar, and are geared some what like horses.—I do not drill my grain, but generally cover it with the plough, followed by the hand hoe, to make a finish; it is generally put in, in September amongst the corn as it stands on the field. I fallow my land in the fall. When I plant my corn in the spring, I plough deep or shallow, though I prefer the former, according to the soil.—Orchards succeed tolerably well here, though I think the peach preferable to the apple for produce.—I have no particular defence for either, except to have the trees looked over, and pruned once a year. I have no doubt but Colonel Taylor's mode of recovering his land, by its own nuisances may be a good one; but then he can raise very little or no stock.

Most respectfully I remain

Your obedient servant,

JOHN TAYLOE.

June 5th, 1809.

RICHARD PETERS ESQ.

REMARKS.

With a view to obtain an accurate account of Virginia farming and rural œconomy, a number of queries, embracing a great variety of subjects, were submitted to *Colonel Tayloe*. He has been so obliging as to return, for answer, the foregoing letter. The general husbandry of Virginia, will be tolerably well understood by its perusal. It may be said without any intention to censure, that it is much to be regretted, that both the mode and results are not better. Yet we believe those of Colonel Tayloe are among the best in that state. His fall and winter ploughing is highly commendable; but the Indian corn and wheat together on the same field, cannot be approved. The very limited use of the clover husbandry, and the neglect of native manures, are much to be lamented. We are highly gratified to find that the product of the grazing branch of Colonel Tayloe's œconomy is applied, in part, to the comfortable subsistence of his slaves. But, with his ample means, and intelligence, a great extent could be given to this profitable business; at less expence of labour and exhaustion of soil, than culture with the plough. He is content with abundance in the aggregate; though the details might, by subdivisions of immense property into less farms, and among more proprietors, be more profitably and systematically managed. Without any reference to our ideas of slavery, as being contrary to what we conceive right; it is questionable whether husbandry carried on by numerous slaves, is even profitable, when compared with farming by white labourers. Those who possess the former are under the necessity of accomo-

dating their systems to existing circumstances. The large proprietors of southern lands, are compelled to make the best use of the means they have. Being no advocates for *agrarian laws*, and feeling no spirit of intolerance on the subject of slavery, as it respects our southern fellow-citizens, who are slave holders, whatever may be our opinions on the abstract question, we rejoice in the amelioration we believe now exists in the condition of the southern slaves: and we are always gratified when we find their labour turned to the most profitable uses, by the proprietors of large and extensive farms; which, under present circumstances, could not be cultivated without them. Substitutes of white labourers are impracticable, under the state of population in our country generally; as well as under the local circumstances of the southern districts of our union.

On Leeched Ashes as a Manure. By Thomas Newbold of New Jersey, M. C.

Read August 15th, 1809.

Washington, June 11th 1809.

Sir,

I received yours of the 3d instant, and can assure you my talents as a farmer have been much over-rated.—I will however proceed to answer your several queries as well as I am able. The soil I have used the leeched or drawn ashes on, is a gravelly loam: and so far as I have been able to discover, that manure answers best for clover and Indian corn: it also answers very well for wheat and rye; but is not equal to stable manure for either of the latter crops. I have used ashes generally on an open fallow, put on at the time of seeding, and ploughed in with the seed; I have put it on after the grain has been sown, with very good success, but prefer the other method. Gypsum will answer little or no purpose to grass on ashed land; from that circumstance I infer that they partake more or less of the same qualities.—I think as near as can be ascertained by the eye, I have taken off of land that had been ashed, and had produced a crop of wheat, and two crops of clover, 35 or 40 bushels of corn per acre, and that without any other help than the single dressing of ashes. The land was so poor before, I am confident it would not have

produced five bushels per acre.—As near as I can guess, I put 150 bushels of ashes to the acre.

With sentiments of esteem,

I remain your friend, &c.

THOMAS NEWBOLD.*

DR. JAMES MEASE.

* Thankful for all communications, and wishing to collect facts, we enter not into discussions about theories, further than these facts require support or rectification. The component parts of ashes, and those of the plaister of Paris, are entirely variant in their leading characters. But that there is no hostility between the two substances, has been proved by long and repeated experience. Mr. Newbold may not have succeeded in the application of plaister, to ground on which ashes had been strewed. Yet in general, success has attended this practice, with most people, within our knowledge, invariably. It was confidently asserted, and for a long time believed, in England, that plaister would not succeed on *limed* lands. And so, until repeated experience had proved the error of both opinions, was it believed, as to *ashed* fields. But there is no doubt now that plaister operates well, both with lime and ashes, if there is any vegetable or animal matter in the ground for the gypsum to operate upon ;—for, what is the exact cause of its operation is yet a theory.

On Bees. By S. H. Smith, of Washington.

Read October 9th, 1809.

Dear Sir,

At length I have seized an hour to impart to you our experience relative to the raising of bees. Living in the country, with very indifferent black ink, I occasionly use red, extracted from poke berry, of which this is a specimen, I am inclined to think it will stand ; and it certainly has the advantage of facilitating the motion of the pen,—to me no small inducement to prefer it.

I am respectfully,

Your friend,

SAMUEL H. SMITH.*

Sidney, September 22d, 1809.

On the 16th of May 1808, a young swarm left an old hive ; we had a hive prepared agreeably to the directions of the Encyclopædia, into which we put them. The new hive (which we will call the first) was placed on a bench below a tree in a court yard full of clover and flowers, and encompassed by a wood. On the 16th of June the new hive sent out a swarm, which was

* The letter and communication written with the extract from the poke, *(phytolacca)* is a beautiful red and promises to be permanent. It would be well to obtain, and promulgate the mode of extracting and fixing the colour.

placed in a hive of the same construction and on the same bench, which we will designate as the *second*. We examined the first hive by gently raising the lid, and found it completely filled. We then proceeded, according to the directions of the Encyclopædia, to take off the upper box, which was done with very little injury to the bees. Had it been done at night, or early in the morning, or had tobacco smoke been previously applied, scarcely a bee would have been killed. We carried away the upper box, and in the mean time threw a cloth over the hive, until having emptied the box, we replaced it in its original situation on the top of the hive. The bees immediately went to work to repair their cells, and clear away the honey which ran down the hive, and proved fatal to a great number of them. The box taken out was three inches deep, was filled with white, transparent, delicious honey, not a cell discoloured, and entirely free from young bees, or bee-bread. In the next box below, most of the cells were filled with young bees in the chrysalis state; while the third and lowest box was principally filled with wax, containing few bees and but little honey. When we left the country, which was about the last of October, the bees had again nearly filled the upper box.

A month after the swarming of the first hive, the 15th of July, we examined the second, and found it filled from top to bottom, we took off the upper box in the prescribed mode, which by being done at night, freed us from all trouble, only six or seven of the bees being destroyed. We were satisfied with finding it filled with honey of equal freshness, purity and whiteness.

In the former instances, we had accidentally replaced the emptied box on the top of the hive, contrary to the directions of the Encyclopædia, which require it placed at the bottom, and the remaining boxes taken successively from the top. In this instance, following the instructions of the Encyclopædia, we ordered the hive to be gently raised from the bench, intending to place the emptied box beneath it. This was accordingly done, but to our surprize, the whole contents were left on the bench, and the bees flew away in every direction. We cleared the bench, and re-instated the empty hive in its former condition, replacing the empty box on the top, with but faint hopes, however, that the bees would return to it after being thus disturbed and pillaged. But, contrary to our fears, they soon began to collect on the bench, and had the next morning by sun rise, all ascended into the hive, where they were busily at work. A few days after, this hive was stolen, but the thief finding no honey in it threw it down. In this state we found it the next morning, and the poor bees in a cluster on the grass close by it. We brought it home and replaced it on the bench, we then spread a white cloth on the ground by the bees, with a piece of honey on it, the bees soon crawled on the cloth, which we took up by its four corners, carried home, and spread on the bench where the hive stood, into which they returned and resumed their labours.

During the present year we have invariably pursued the same course, always replacing the empty box on the top of the hive, with the like success.

The directions, given in the Encyclopædia, must have arisen for the want of an accurate obs.rvation of

the œconomy of a hive, which, from the accidental circumstances stated, the suggestions to which they led, and the interesting nature of the subject itself, we were induced to examine with very minute attention. This instructed us that the bees appropriate the top of the hive exclusively to pure honey, intended probably entirely for their food in winter, as they carefully close the cells as they fill them. The middle of the hive is their nursery, which is filled with bees in their various stages from a little maggot at the bottom of the cell, to a large maggot that completely fills it, and to that changing into the chrysalis state where it is no longer fed. In this state they are shut up, the mouths of the cells being closed with wax, where they remain until they are perfect bees. The change appears to be very gradual; for we examined at least an hundred cells, and found them from the maggot just shut up, to where the honey-parts of the bee begin to appear, though still white, to where the bodies turn to a darker colour, to where the whole body changes; to where at last the bee is found alive and perfect, but still enclosed. Whether they extricate themselves, or whether their prison door is opened by the older bees is not certain, though from the observations we made, the latter is most probable. In the case stated where the contents of the hive fell out, we found several of the cakes filled with bees, most of which had just awakened from their chrysalis or torpid state, but were still prisoners. We opened a great many of their cells with a needle but with all our care, we injured the young bee, which so completely filled the cell that the point of a needle found no room. We then thought of laying the comb thus filled, on a dish by the side of the

hive, which being done, it was soon covered by the old bees. The day being extremely hot, our attention was for some time withdrawn; but on examining them in the evening, we found the cells all open, and the prisoners escaped, which leads to the opinion that they were liberated by the old bees.

From these facts it would seem, that the division of the hive into four boxes is useless, the upper box being the only one that contains honey fit for use. Even the removal of this is prejudicial to the bees, as the cutting through the comb causes the honey to stream down, by which a great number of the bees are drowned.

It may here be not improper to mention a method communicated by Mr. Coles, (secretary to the late president U. S.) who says that in the western section of Virginia, where he resides, they raise large quantities of bees; and that from the peculiar construction of the hives used, they are enabled to take a great deal of honey without disturbing any of the bees, who consequently multiply with unusual rapidity. The hive is composed of two boxes; the lower one is about one foot wide, and three feet high, with a close cover in which there are four holes, one at each corner, large enough for the bees to pass up into the superior box, which is about a foot in every direction, and is without a bottom. Into this the bees ascend, and fill it always once, and sometimes twice during the summer, with pure honey; while in the lower box they deposit their eggs, rear their young and store their wax. This box is never disturbed except when wax is wanted. The upper box by being carefully slid off, is taken without a single bee, or even breaking the comb. These hives are kept

in a house the door of which is never opened except when honey is wanted. They are placed on shelves, with their little doors adjusted to a corresponding aperture in the wall of the house, through which the bees pass.

S. H. S.

September 22d, 1809.

Plan for establishing a Manufactory of Agricultural Instruments; and a Warehouse and Repository for receiving and vending them. By Richard Peters.

I have long seen, and desired to remedy, the defects in the agricultural instruments, in common use throughout our country. If any are found (as many of the common implements are) either intrinsically good, or on a valuable and efficient plan, they are not easily multiplied, or readily obtained. The workmanship is often faithlessly performed; and the materials are frequently worthless. If a mechanick is celebrated for his skill, and and succeeds in the execution of any particular article, he has more demands than he can fairly supply; and is, too often, seduced into negligence and forfeiture of character, by using unseasoned timber and other inferior materials, and slighting his work, to encrease or support his business and profit. And yet, in general, the farming utensils and implements in our state are, as I believe, superior to any others in the United States. Few workmen, with the best inclinations, have opportunities of seeing perfect models; either of new instruments, or of improvements on those already in use. No *manufactory of agricultural instruments in general*, exists; and much embarrassment, delay and difficulty, are found in the collection from various and distant places, and from workmen of various character and capacity, of all the implements of husbandry required for even common operations. The inventions of ingenious men of our own country, are, for the most part, confined to narrow districts where they are used; and

many valuable foreign instruments are little known among us. Some are introduced from abroad, and found complicated, expensive and inapplicable to the state of our agricultural circumstances. The best and most eligible instruments are those on simple principles and construction; faithfully made and easily repaired.

I wish to suggest to the society, the following *sketch* of a plan; which, if well executed, may be extensively beneficial.

1st. That a *manufactory of agricultural instruments* be established; under the patronage of the society.

In this may be made every implement of husbandry for the common, or, if required, extraordinary operations in our agriculture; on the best plans and construction. Those newly invented, or used in foreign countries, if approved on trial, may also be manufactured, in addition to those generally known. But none are to be sold without having passed under the inspection of a person or persons appointed by the society; and *stamped* as the society shall direct.

2d. *A warehouse* for the reception and sale of all agricultural instruments, made at the manufactory, obtained by the director for sale, or sent there to be disposed of on commission.

This would draw together every kind of implement worthy of attention; either imported, made at the manufactory, or in any part of the city, in the towns, or other parts of this state, or the neighbouring states. It will become a highly useful *place of exhibition*, of every species of farming utensils, and of all articles used on

farms, including those for the dairy, and every branch connected with husbandry: examinations of their constructions and utility, and inspections of their qualities, may be made by direction of the society, and, if approved, they may be *stamped;* and thereby recommended.

Models may also here be deposited, for inspection and imitation.

Here, an assortment of every implement wanted, may be at once obtained, and the kind and quality ensured, so far as the society can be reasonably expected to be responsible, with the common care and attention of its members; who can spare from their necessary vocations, only a portion of their time.

It is not intended that the society shall be subject to any losses, or enjoy any profits. A person well recommended for his intelligence, integrity and mechanical talents, (but removeable for incompetency or misbehaviour) must be procured; who, for his own benefit, will undertake the management and direction of the manufactory, as well as of the collection and sales of all articles. If, added to other requisite qualifications, he has some agricultural knowledge and propensities, his capacity for the employment will be the more perfect. He may associate with him others, skilled, or necessary, in any branch or branches, if he (as he no doubt will perceive it to be) finds it convenient or proper. But he must be subject to such rules, as shall be mutually agreed on. These rules will be calculated only for the credit and usefulness of the establishment; and he will find it his interest to comply with them. On a for-

tunate choice of the person charged with the direction, the success of the plan almost entirely depends.

It may most probably be necessary, that some pecuniary assistance (on such terms as circumstances require and justify) should be afforded in the commencement of the plan.—Therefore a subscription (either on loan, contribution to our stock or funds, or in some way most likely to succeed) may be promoted; so as to obtain from public spirited individuals, a sum not exceeding dollars. This is to be applied under the direction of the society. Every practicable care will be had that it be used faithfully, and employed profitably and safely: and possibly it may be so managed as to obtain an interest for the subscribers, who must, however, take their risk on this subject; the society to be only responsible for using their best endeavours. Being now incorporated, we can more legally and correctly receive, dispose of, and manage, whatever funds may be furnished to us, for the purposes of our institution.

This wealthy and flourishing city has become one of extensive and various manufactures, as well as of commerce. In the former it is less rivalled, than in the latter. The plan herein proposed will add, in no small degree, to its celebrity and advantages, if success attends the establishment. The interests of our city, as well as those of other parts of the state, should induce pecuniary and other encouragement, even from those not directly engaged in, for all are consequentially benefitted by, the agricultural improvement, and rural prosperity of our country. These are the immediate objects of our association. In their accomplishment we may entertain (as all our endeavours are gratuitous, and personally disinterested) well founded hopes, of being encouraged and assisted by the patriotism and public spirit of our fellow-citizens.

Such a manufactory, with its warehouse and repository, once in operation on an extensive plan, will give employment and profit to numerous workmen of almost every description. It will not be necessary that all these should work in the manufactory.—They may, in their own work-shops, wheresoever situated, complete instruments according to models furnished, or agreeably to their own ideas, and send them for sale, or vend them to the director; so as to afford them a profit, and to him a reasonable advance.

To the AGRICULTURISTS of our own, and of every other state (and to those of the southern states particularly, where the demand is great, and where few or no instruments of husbandry are made) most important advantages will be derived. They will be certain of finding at one place, a general assortment of the implements they require; and have the most probable assurance of the good quality and construction, of the articles they order. Encouragement, by extensive demand, will induce fidelity and integrity in the director; whose emoluments will encrease and continue so long as he maintains his reputation; as well for the construction, workmanship and materials of the articles he supplies, as for the moderate rates at which they are obtained. And it may rationally be expected, that they can be afforded on the best terms, when the demand warrants the employment of a capital not usually within the means of workmen, or dealers on a small scale. Among the benefits to be derived from the

command of capital, the providing the best timber, and waiting for its being seasoned before it is used, as well as the selection of other materials of prime quality and at reasonable prices, are of the first importance. Emulation will be created in and forced upon, workmen not connected with the manufactory. They will be under the necessity of attending to the quality of work made and sold by themselves; or if sent to the warehouse and exhibition rooms for sale, they will be careful that its quality and construction will stand the test of inspection; and entitle it to the stamp of the society. This the laudable pride of some, and the interest of all, will induce them to value; and care should be taken that it be judiciously, as well as impartially applied or withheld.

To the ingenious, industrious and faithful workmen of all trades connected with agriculture; and to the inventors of, and improvers on, instruments employed in husbandry; the repository for exhibition and sale will be incalculably beneficial.

In whatever light this subject may be viewed, by those who have not paid to it the necessary attention, the profitable extent to which such a plan and establishment may be carried, is almost incredibly great. But prudence and necessity warn us, that in its origin the measures should be suited to the means; which in the outset cannot be expected to be any wise competent to its full perfection. If success and good management attend its progress, its own operations will produce and ensure the means and facilities of enlarging it, to any extent the demand requires. This demand is now prodigiously great, and is constantly encreasing with the

population and improvement of our country. Multitudinous bodies seldom succeed in such pursuits; but this manufactory and warehouse will combine the advantages arising from the countenance, assistance and encouragement, we can afford; and those accruing from private enterprize and industry, stimulated by profit and reward to individual exertion.

RICHARD PETERS.

Belmont, July 15th 1809.

The ware room could be made, in addition to its other uses, a place for receiving and distributing all kinds of *grain and seeds*, either sent or procured from other countries, or collected in our own. Their diffusion might be effected by sales; or, when justifiable, gratuitously. All specimens of *earths*, or any *native substances* calculated for manures, or other agricultural purposes, might therein be exhibited.

The society, not having funds to carry on the plan proposed, have given to it their decided approbation, but could do no more; save that they have promulgated it, for general information. No person has yet dared to carry it into effect. The society know too well the inefficacy of attempts at extensive manufactures, by bodies of men composed as they are, of citizens, whose time is indispensibly devoted to their private concerns. Enterprising individuals, assisted by patronage and encouragement, succeed best in such undertakings; when their own emolument stimulates exertion. And the plan is formed, under this view of the subject. It is confidently believed, and earnestly wished, that some person, competent and ingenious, will e'er long see its advantages, and undertake its execution.

R. P.

Extirpation of Wild Garlick. By Richard Peters.

Read December 11th, 1809.

Belmont, November 29th, 1809.

Sir,

As we have no communication on the subject of destroying *Garlick*, I have copied one, made to our agricultural society of *Blockley and Merion*, by my very attentive and respectable neighbour, *Algernon Roberts*. It proves the efficiency of repetitions of *plaister of Paris*, in addition to the object inducing its being made.

"In the spring of 1802, I planted a field of about 15 acres with Indian corn; in the succeeding fall I limed it, with 40 bushels per acre. The following spring (1803) I planted it again with Indian corn. It produced a very poor crop; which I attributed more to a want of proper cultivation, than any other cause.—The succeeding spring (1804) I sowed the field with oats. After getting off the oats, I ploughed down the stubble, harrowed well, and sowed the ground with clover seed. The season being very dry, the seed did not take to answer my expectations. I next spring (1805) sowed the field with oats; and after harrowing in the oats, I sowed two bushels of clover seed, and then rolled the ground.—The seed took exceeding well; and that fall produced a good crop of pasture. In the spring of 1806, I sowed the field, with 29 bushels of plaister, and it produced pasture fully to my expectation. In the spring of 1807, I sowed 22 bushels of plaister, and the pasture

continued much as the preceding season. In the spring of 1808, I omitted sowing it with plaister; and thought the pasture that season rather declining. I this spring (1809) sowed the field with 30 bushels of plaister; and find the pasture improved, when compared to last season. I have no doubt many will censure the foregoing, as an execrable rotation; and as such reject it. My reason for adopting it was, that I knew the soil—a gritty gravel—well adapted to clover and plaister; and being much infested with garlick, I determined to try a succession of spring crops, to *destroy the garlick;* and the event has fully answered my expectation. The soil being well adapted to clover, it continues to be the prevailing crop; upon which the plaister has had, and continues yet to have, an exceeding good effect. And this I have found invariably to be the case, as long as clover continues to be the prevailing grass. But in all other cases, when other grasses subdue the clover, I find the application of plaister to be of small *effect*." "August, 1809."*

* This is generally found to be so; by long experience. It will appear hereafter, that in *Europe*, the like results occur. Among other proofs, are the experiments of *M. Berard*, hereafter inserted.

R. P.

OBSERVATIONS.

A spring oat crop, sowed early, in the fallow intended for wheat, is, by very many, believed to be the antidote against garlick. Although I am opposed, in general, to sowing oats on light soils; and especially if they immediately precede a wheat crop; I am not among the number, of those (if any there be) who will censure Mr. Roberts's course of crops, as "an execrable rotation." I see not that, for his object, he could have pursued a better. There were two crops of Indian corn, two of oats, and four of clover, plaistered generally. If he had fall-ploughed every autumn, while his field was in tillage, his object of destroying garlick, would have been the sooner accomplished; and other advantages would have been gained. Successions, year after year, of the same kind of grain, are not justifiable, nor profitable. But his object was not so much for the crop, as for its agency in the conquest of his enemy. Frequent stirring for corn, and early ploughing for oats, were his means of destruction of the pest he aimed to extirpate. My experience for 40 years, has convinced me that the early ploughing in the spring, and most especially if it succeeds a *fall ploughing*, is the remedy; and the oats gain the credit. Among its disadvantages, oats has one benefit intermixed. It *compels* early ploughing. Facts are, I know, *pro* and *con*, on this subject—But it is difficult to judge of relations of facts, without knowing concomitant circumstances. And many of these are undesignedly, and without attending to their bearing on the point, omitted. The desire to get a crop, to pay for labour and expence immediately, warps the judgment.

Remote benefits are seldom contemplated. It is not easy to abandon habits; and it seems that bad ones lay the fastest hold. A neighbour (the late Mr. Thomas George) had a field near to both Mr. Roberts and myself in; which he planted Indian corn, for many successive years. In vain I endeavoured to dissuade him from such injurious repetitions. Corn is an exhauster;—"he could remedy this by dung;"—but his remedy failed as to the corn; though he enriched his field. The corn, year after year, dwindled, till it had a stalk like small *bamboos*, and ears of the size of *nubbins;* many whereof were entirely barren. He practically convinced himself (an expensive mode of argument) and abandoned the practice; which, he said, was supported by many instances of success. He never *fall ploughed* in this field, nor fallowed with the opening of the spring there, though he did so in other fields. This field may be now viewed, and it will exhibit a plentiful cover of garlick; the *repeated succession of Indian corn crops notwithstanding*. Yet his field was not impoverished; for, by changing his course, a fine crop of wheat succeeded his abandonment of the Indian corn culture.*—In many parts of his agricultural operations, Mr. George had correct

* This having been the most decided proof of the necessity of change of crops I have known, I have mentioned it on several occasions. But, so far from its having been the only instance, that it is but one among very great numbers I have seen, and could enumerate; though none have occurred so strongly marked, because not so pertinaciously continued.

R. P.

ideas.* He gave me many facts as to the effects of early ploughing, with a view to turn up garlick in its tender

* I have been frequently a witness of Mr. George's bold and successful attempts at ridding his pasture fields of *garlick*, by hand weeding, in moist weather. I have seen, at various times, tons of it thus collected. He said he could subdue it so, as that it did not feculate his butter; and he was doubly repaid, by the increased price, and ready sale of that article, when it was generally tainted in the market. Being often obliged to pass one of his large heaps of garlick, I had the curiosity to attend to its progress, in its fermentation and putrefaction. The fætor was almost insupportable; and far exceeded any effluvia from animal putrefaction. It resembled in my sensation, a combination of the strongest extract of *Asa-fœtida*, with the most pungent volatile salt.—Some one, who has the propensities of Smollet's *Lismahago*, with objects more meritorious and useful, might discover, in the wild garlick, properties, valuable either in medicine, the arts, or manufactures; to balance its mischiefs and abominations.

Mr. George's weeders each carried home, at noon, his wallet or basket full of garlick; which was thrown into the horse troughs, and greedily eaten by the working horses. He said it was not only nutritious, but gave them spirit and vigour, to perform the remainder of their daily task. Occupants of garlicky lands, who are too often, in the spring, short of forage; find the early pasture of the garlick both useful, healthy, and indispensably necessary for their stock. Although it is at first laxative, it finally becomes regularly nutritive; and cattle and sheep thrive on it. Change of pasture, or dry food, for a few days, (or as some say, forty eight hours) will take off the taint from their flesh.

I have never seen in new lands, the garlick, or wild onion. Its bulb resembles the latter; being indistinctly lamellated, though chiefly solid; and not divided into cloves like the

state, *when just beginning to shoot;* and, by this means, to backen or destroy it. He believed that it was the ploughing, and not the oats, which produced the effect. But, having a large dairy, fed in the winter with oats and corn, ground together in certain proportions, he was of the sect of oat farmers; and of course found reasons to justify the practice. An oat fallow, he allowed, required more dung than common, to restore what the oats had exhausted. But he said, "with plenty of lime and dung one can farm as he pleases." However true this may be, the question still remains to be solved. —What is the best course for those to pursue, who either have, or have not, this plenty of lime and dung? For myself I answer—not to sow an exhausting *crop of oats*, to be succeeded by another culmiferous* crop

former. Its head contains a multitude of *cloved seeds:* and, on this account most resembles the bulbs of the *allium* or garlick. But these seeds are entirely different from those of the onion. It is destructively prolifick; for several bulbs will be formed from one clove of the head.

There is an old tradition, that the *Swedes* first imported and sowed it here, for early pasture.—But I have always believed it to be a spontaneous native product; the companion, if not the offspring of poverty; originating in worn and exhausted lands. *Swedes* having been early settlers, their lands were the first exhausted; and in them the *garlick* made its first appearance, of course.

R. P.

* *Culmiferous crops* are those of grain enclosed in *chaffy husks.* They are fibrous rooted and exhausting. They give little to the earth; and draw from it the stores of vegetable food, which it had collected.

of winter grain—the most valuable but the most dominant exhauster—A further practical answer, is attempted in what follows hereafter.

Mr. *Roberts*, whose farming and management is generally exemplary, candidly gives the preference to an open fallow; though he has been in the habit of sowing wheat after oats. See our memoirs, page 100. But not having, for several past seasons, had encouraging wheat crops, he has this year sown on an open or clear fallow. Killing garlick and his demand for oats, form his apology for sowing them heretofore.

Wheat greatly exhausts; but it occupies the ground long, and draws its supplies, gradually, and extensively. Its roots delight to penetrate and spread, beneath the soil stirred by the plough. It does not injure the vegetable mould like oats;—rapid in their growth, with shallow and superficial roots, numerous and peculiarly fibrous. When cut for hay, oats do not in any great degree exhaust: nor does any crop till it perfects its seed.

I have now a fine field (small but well tilled) of wheat. Two years ago it was so infested with *garlick*, that the hay, in winter, was unfit for my cows; as it gave their milk a most disgusting taste. In 1807 I gave it a fall ploughing; and in the spring of 1808 I ploughed it again; as early as the frost permitted. At the usual time (the beginning of May) I planted Indian corn; which I so well attended, that not a weed was to be seen. My crop of corn was remarkably abundant; though the season was unfavourable. I cut off the corn stalks, and hauled them into the barn yard, as I usually do, for manure.—I fall ploughed it again; and limed lightly. Wishing to cover my fallow in the spring, and, by

an example, to intice the oat farmers to intermit their inveterate habits, I procured *Albany peas*, sowed them broadcast, and harrowed them in; after which I rolled them. I was obliged to send to New York for my seed, which occasioned delay; and, although I ploughed early, I sowed a month too late; not getting any seed into the ground until the middle of May. I had succeeded with peas many years ago; but had forgotten the requisite quantity of seed to the acre. I sowed *two* bushels to the acre; whereas *three** had been formerly my usual quantity. They came up even and looked remarkably well, till the pods appeared; when heavy rains laid them, and my expectations were disappointed. I lost my crop of peas; but I did not lose the benefit of their cover. Two acres of the same field were highly dunged, and planted with potatoes; whereof I had a plentiful crop, which came off early: I sowed wheat in the potatoe ground, ten days before my pea fallow was ready. A remarkable dry season prevented my sowing in the time I wished. During the drought, I gave an extraordinary ploughing to cover and protect a moderate dressing of

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* I have now a very promising crop of the field pea. I sowed it early, with three bushels to the acre. Next year, I will, on part, sow four bushels. We have had the greatest drought, for two months, I ever recollect at this season of the year. Yet my peas (plaistered,) have continued to thrive. Most fortunate rains have now given them every advantage; though in a more favourable season, they would have been more forward.

R. P.

15th June 1810.

well rotted dung, on the pea fallow. About the middle of October, I harrowed in my wheat; sowed on it timothy seed, and rolled it in. With all the advantage of earlier seeding, the wheat on the potatoe ground is inferior to that on the pea fallow; though both look well.* The *garlick* is apparently destroyed on the whole field. I could in the winter, have collected many bushels of dead bulbs of garlick; which had been exposed, by the harrows, after the fall ploughings. In this way I have cleared many a field of the garlick, which infested them at the time. But in three years (often in two) the seed, which had been lying torpid, vegetated; and produced a new crop of pests. By attacking these with a fall, and an early spring ploughing, I have banished the garlick for many succeeding years. My present flattering appearance may turn out fallacious; I therefore will postpone my *Te Deum* till I am certain of victory. It seems as if *garlick*, once rooting itself generally in a field, gains an endless possession in the soil. Like a chymical compound (which according to a recent discovery, can never be so decomposed as that all its parts will be completely separated) in a greater or less degree, it forever

* Every expectation I had formed respecting the wheat on the pea fallow, is confirmed. It far exceeds that on the potatoe ground. There has been a long drought; yet the pea fallow wheat is nearly as good, as a crop in a favourable season. I have drilled wheat (hoed) superior to it; but it is among the best *broadcast* wheat, I have seen this season. No garlick yet appears in the field.

R. P.

15*th June* 1810.

infests and adheres. Scattering bulbs, to continue the succession, will remain covered by the plough, and out of the reach of destruction.

I have a field adjacent preparing for a similar course; and shall repeat my experiments of leguminous * cover. I am much mistaken if my campaigns against the garlick, are not equally successful with those of my worthy neighbour. My object has been, as I now believe, accomplished in a shorter time; with less exhaustion and better culture. It will be perceived that I rely, for extirpating garlick, on my frequent fall and early spring ploughings. A winter crop intervening prevents repetitions of the ploughings; and impedes the entire overthrow of a crippled adversary. It gives time to the garlick to recover its vigour.

The loss of my peas is of much less consequence, than my failure in setting a profitable example. For such failures confirm prejudices in others; though I shall not be in the least discouraged, in my object of substituting beneficial for exhausting covers.—It is in support of this object only, that I am induced to say—

* *Leguminous plants* are those whose seeds are enclosed in pods.—Every species of the pea and pulse kind are *Legumes*. They shade and cover; their tap, or main roots strike deep; and do not prey upon and exhaust the vegetable mould, as do plants shallow set, and entirely fibrous. Exposing to the influences of the atmosphere, surfaces porous and extensive, they draw from the air their chief supplies. They probably give to the earth, a balance beyond their receipts from it; which, by their shade and cover, they enable it to retain.

R. P.

that I shall not meet with my usual success in my wheat crop; if it does not far exceed that of any oat farmer's. On the pea fallow, I am particularly confident; and will throw into the scale of competition against me, all loss in the pea crop. Accidents and misfortunes disappoint the best founded hopes. But these alike assail the crops of others, as well as mine. Independent of the views of the subject as they relate to the extirpation of garlick, I am convinced, by long experience, that, with fall and early spring ploughings, more will be gained in the winter grain without oats on the fallow, than the crop of the latter grain is worth, in a *general course* of seasons and prices. It is in my opinion, though a very common, yet not the less injurious mistake; that the operation of breaking up or ploughing for a winter crop, is the last performed in the fore part of the season when it should be the first. Before either ley or stalk fields (as those are called which have had corn in the preceding season) are turned up, the garlick and weeds of all kinds grow strong and unconquerable.—They are easily killed, if attacked by early ploughing. It has been my constant habit to plough early, deep, and often. I never sow wheat with less than four ploughings; and three are the usual number with most other farmers. I have never yet failed to perceive the great advantage of ploughing in the fall. This operation should in general be the deepest, i. e. from five to seven inches; because the raw or barren earth turned up to the winter, is ameliorated by exposure in that season without exhaustion; which is not the case with naked summer fallows.—But the fall ploughing of a garlick ley should be shallow, i. e. not to exceed three or four inches; and it should be

harrowed in the direction of the furrows; that the bulbs may be the more loosened from the sod, and entirely exposed to the frosts and thaws.

If the course here recommended is not perfect; it is nevertheless the best I know to be in the power of common farmers.—*Denshiring*, or *paring and burning*, is an effectual mode to eradicate all pests in the sod. But this is not likely to be resorted to, in the present state of things. *Trench ploughing* is also a sure mode; as I can, from repeated experience, attest.

Graziers and large dealers, may extirpate garlick by great numbers of cattle, winter fed on their ground. The late Mr. William Jones succeeded in this way, at *Garlick Hall* in the neck. The poaching and tramping the sod, as well as fertilizing the soil by the droppings from, and the laying down of, cattle, afford the remedy. But this mode is attainable by a few people only.

Garlick grows in poor and exhausted soils generally; but, like all robbers, it does not spare the rich. It is propagated by the seed and bulbs, or roots. When the parent bulbs, or old roots, are destroyed, the seed, in two or three years, will produce another race of pests; as if it were intended vindictively to punish the destroyer of their predecessors. But as soon as this vile progeny appears, they should at once be assailed; and, being tender and weak, they are the more easily overcome, by a fall and early spring ploughing. A variable winter of severe frosts, with intervals of thaws, and a late spring, with frosty and chilly damp nights, and occasionally warm days, are favourable to the destruction of the bulbs, exposed to such vicissitudes. These observations are extended beyond my original intention.

I was induced, by a practical conviction, to gratify a desire to show, that the object is most profitably and promptly attainable, by a course of husbandry which ameliorates, instead of exhausting, the soil.

RICHARD PETERS.

DR. JAMES MEASE.

Secretary of the Agric. Soc. Philad.

The Field-Pea.

There is a very general mistake, in this part of the country, respecting the culture of the *field-pea.* It is supposed to require much labour, and it is conceived that they *must* be sown in drills, and stuck. True it is that, like *beans,* when sowed in drills, and hoed, they produce more abundantly; and so will any plant. But there is no more expence, or labour, in the usual mode of cultivation, than with oats. They are sown in broadcast; and harrowed in, in the direction of the furrows. When ripe they are cut with the scythe, or that and the cradle, if they stand up well; raked up when dry, and stacked, or housed. They are threshed in the common way; and cleaned in the common fan, nothing is equal to them for rotting a sod; and in *Europe* they are often sown on a ley, with one ploughing; for the purpose of rotting it, as well as for the crop. They delight in light soils, the most; but will grow in others. They are as certain a crop, as the grains in common use. Pease often fail, as do other crops. But when appearances are against

them, they may be ploughed in, as green manure, to profitable account. When they perfect their crop, or when ploughed in, they do not fail to meliorate the soil. *Beans* are best, for heavy soils; but they do not often succeed here. Pease are in great demand, for ships provisions, or exportation; when split, or whole. Chopped or ground for cattle, they exceed oats, either for milk, or fatting. Hogs are fond of them; and they may be given to fatting, or stock swine. But the former must be finished off with Indian corn; which makes the bacon of this country superior to that of Europe. Horses are fed on pease in England, and other countries.

R. PETERS.

On Garlick. By Paul Busti.

Read January 9th, 1810.

Blockley's Retreat 1st *January* 1810.

Sir,

Wishing to make it appear, that the importance of communicating the results of practical experiences, is the most useful manner of disseminating among the farmers, the knowledge of the precious art of agriculture. I venture to submit the observations I made on the best mode of extirpating the nauseous plant, that poisons so many of the fields in our neighbourhood:

The Garlick.

When in 1806, I bought Parkinson's estate, and found the hills beyond the creek so much infested with that pestiferous vegetable, that unable to convert into palatable bread the wheat and rye which the tenant then resident on the place divided with me, I used the whole of my share for feeding the cattle. The next year I resolved to try whether I could destroy it. I met with no certain advice by consulting my neighbours, as their opinions were quite in opposition together. On two hills where in 1806 grain was raised, and clover sown, I pursued a different method. On one I caused a quantity of plaister to be spread, thinking that the quick vegetation of the red clover, would suffocate and stifle the garlick. The other hill was early in the spring ploughed and prepared for Indian corn.

No benefit whatever having been derived from hastening the vegetation of the clover, (for the garlick received likewise advantage from the plaister;) I set in 1808, a man about pulling the bulbs before the seeds were ripened. Six cart loads of plants having been pulled up, I thought to have gained the point; and in the fall of that year I manured and ploughed the ground; throwing in rye seed, in the proportion of two bushels per acre. In reaping, I soon discovered that the enemy was far from being overpowered. The quality of my rye made me condemn it to the use of the stables. I met with a better success on the hill, where the corn had been planted in rows. Many garlick stalks came up, but were cut down and overturned by the plough in dressing. Few escaped unhurt. Determined however, that none should remain, and convinced, by the simple reasonings of plain good sense, that a frequent stirring of the ground must prove the best check upon the growth of any vegetable; I converted in the spring of 1808, the corn into a potatoe field, adding a good deal of manure. I may with truth boast, to have perfectly succeeded in subduing the garlick. For among the rye harvested this year from that spot, not a single seed of garlick was discoverable. From the dissertation of Judge Peters on garlick, lately inserted in Poulson's paper, I have however learned to be diffident of my complete victory. It may happen, that some bulbs or seeds still remain sculking among the clover and other grasses sown amidst the rye. Should this be the case, it will soon be discovered next spring; and, if so, I intend to go over again the same rotation of crops, not doubt-

ing that if in completing one, I have had reason to think I had got the palm of triumph, my efforts will be crowned with full success after a second rotation.

I have the honour to remain,

Sir, your most obedient servant,

PAUL BUSTI.

Dr. JAMES MEASE.

On Moles. By Dr. Barton.

Read January, 9th, 1810.

Dear Sir,

I have lately perused, with not a little satisfaction, in one of the British Agricultural Magazines, some observations on the utility of moles. It is well known to you, that the mole has, by most writers, been considered as a very pernicious quadruped; and that the business of mole-catching in England is not an unprofitable one to those who follow it. The observations to which I allude, have nearly convinced me, that the common mole of Europe, is upon the whole more beneficial than pernicious to the labours of the agriculturist. To the garden it is acknowledged, that the mole does prove injurious.

The common mole of the United States, which Linnæus denominates, for want of better information concerning it, *Sorex aquaticus*, is specifically distinct from the mole of Europe. But the two animals are, in many essential respects,—as of structure, appearance, way of life, food &c., nearly allied. Almost every one believes, that our mole, which I have no doubt infests or visits your ground, for it is very common along the Schuylkill,—that the common mole of Pennsylvania, is a very pernicious animal. I wish you could turn the attention of some of the members of the agricultural society to this subject. It is one of no small consequence. I greatly doubt if this mole be so pernicious as is imagined. I have long entertained doubts on the subject. I suspect

that it will be found to render more service than to do mischief; I mean in our larger fields. When it gets into gardens, it may do much mischief. But even here, if I do not greatly mistake, the evils which have been ascribed to this little animal, have been much exaggerated. I could show you, that it even does some good in the gardens.

Should you, or any other member of the society, deem it worthy of your attention to inquire into the correctness of the general notion, that our mole is a very pernicious animal, I hope you will be careful to specify the animal to which your observations may refer. We have, at least, two species of moles near Philadelphia, which are in many respects, different; I mean the *Sorex aquaticus* about which I am most concerned, and the species called by our farmers, the "star-nose-mole," or *Sorex cristatus*. Confining myself to the former species, much the most common, let me ask the following questions: viz.

1. What kind of grounds are most frequented by this animal? Is it ever found in the wetter meadows?

2. What vegetables does it chiefly consume? Does it injure the roots of the red-clover? Does it ever injure the Indian corn?

3. What insects does it eat? Does it not devour grubs, and other *larvæ*, of beetles, &c.

4. In what way does it prove most injurious?

5. By loosening the earth, and thereby enabling the radicles of different plants to progress with more facility; and by devouring a portion of the radicles which it meets with, does not the mole of the United States, do quite as much good as harm?

6. At what season of the year does the mole bring forth her young? Or has she not, at least, two litters in the year? What is the number of young produced by a single pair, in the year?

7. May we not, by preserving moles from unnecessary destruction, turn their beautiful fur to useful purposes in the United States?

I am, dear Sir,

Very respectfully, yours, &c.

B. S. Barton.

December 19*th*, 1809.

Richard Peters Esq.

Foreign grain sent for seed.—A new plough and experiments therewith, at Draveil the seat of Daniel Parker Esq. neat Paris. By John Armstrong.

Read January 9th, 1810.

Paris, 2d November 1809.

Dear Sir,

The little box which will be delivered with this letter, contains three species of grain and one of grass seed, which I do not remember to have seen in the United States.

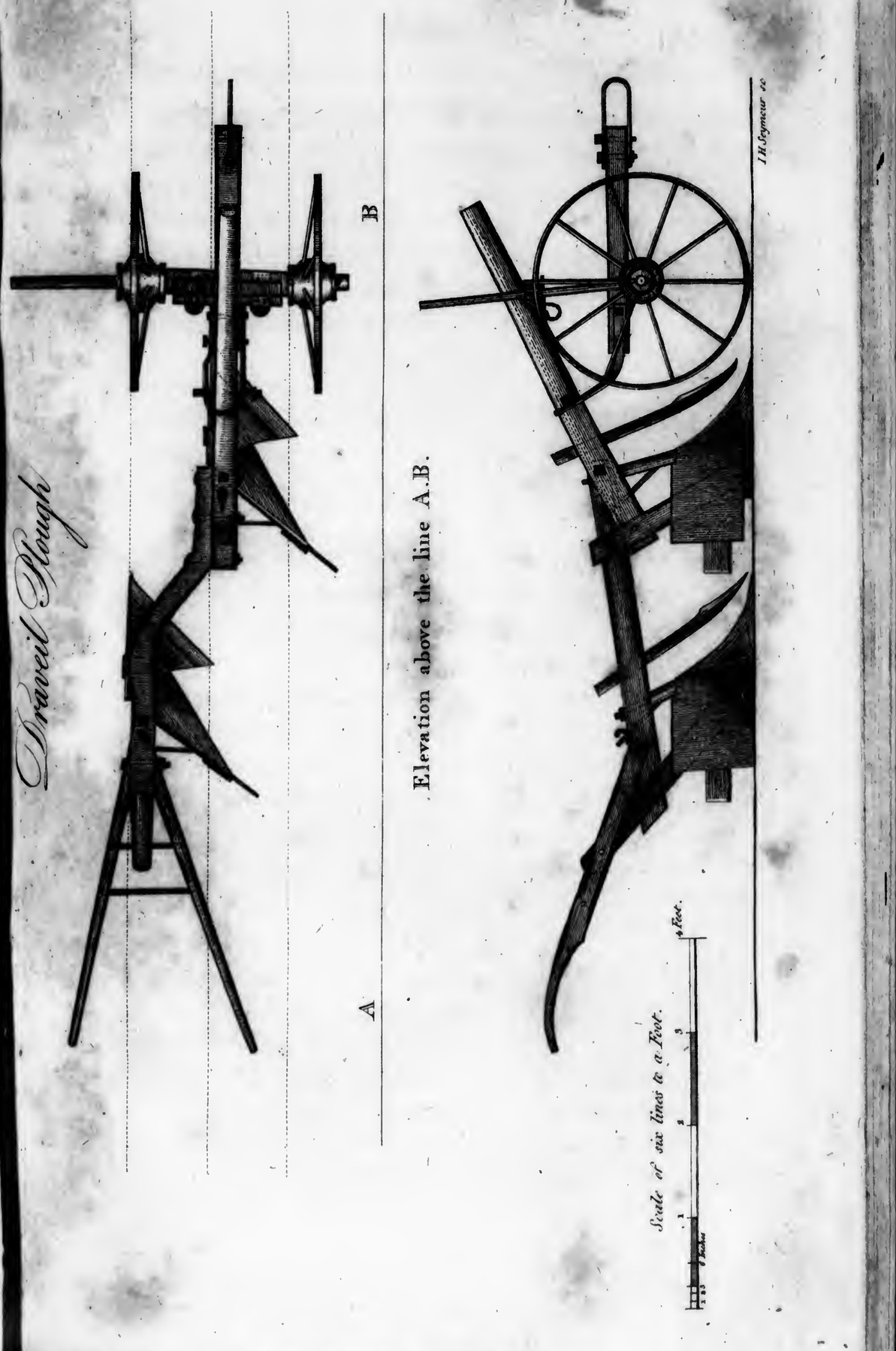
Number 1. Is a *wheat* which from its uncommon productiveness, as well in grain as in straw, is called *le ble d'abundance.* It is said to be of African origin, and is sometimes called Egyptian wheat.

Number 2. Is a *rye* of excellent quality, giving a flour little inferior to that from wheat. One bushel of this grain weighs 64 pounds, and its straw, like that of the preceding article, is very stout and nearly solid.

Number 3. Is a *barley* called here *l'orge fromentet* or wheat barley, from its resemblance to some species of wheat. An acre will give as many bushels of this as of any other species of barley; and a bushel of this species, will give considerably more flour than the same quantity of any other species.

Number 4. Is the seed of the Sain-foin of Normandy, which gives as many hay-cuttings as Lucerne, and a tolerable after grass for pasturing cattle.

To these I add the drawings of a new invented *plough*, and a minute of work, which I last spring, saw



it perform at Draveil, the seat of our countryman Daniel Parker. My own opinion is, that in light and level lands, this instrument will supersede the use of all others of the same name.*

Committing these worthy foreigners to your protection and patronage, and hoping that like our own potatoe, they may improve by translation.

I am dear sir,

Yours truly,

JOHN ARMSTRONG.

RICHARD PETERS ESQ.

P. S. Having an un-occupied corner in the box, I fill it with one of these *adopted sons*, which does no discredit to his parentage. Its present weight is two pounds and a quarter. The field in which it grew contained twelve acres and a half, and gave 10,000 Boisseaus (20 pounds each) 100 of the largest, weighed 200 pounds, the one I send was the second, or third, in point of size. This gigantic race is called the *champion*, and is not inferior to any of the family, for the uses of the table.

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* Nothing can be more grateful or patriotic, than the exertions of our citizens, in whatever station or pursuit they are occupied abroad, to add to the prosperity of their country, the knowledge of agricultural improvement, by transmitting models or drafts of useful or new implements, or valuable grains, seeds or plants.—General Armstrong is entitled to much praise on this account. The grain and grass seeds will be faithfully attended to, and the results reported.

The *Egyptian wheat* has most generally failed, though repeatedly sown here.

Extract from the Farm-book of Draveil, October 31st 1809.

A statement of the force required for the working of the several ploughs underwritten; determined by essays, made at Draveil on the same piece of land, a sandy loam, with the Dynonemetre of Regnier:

The ordinary French plough, 563 pounds.

The Rotheram plough with wheels, 427.

Small's improved Rotheram swing plough, 396.

The *rye* is a most valuable desideratum; if it suits our climate. It shall be sedulously nurtured. Crops of rye, in many parts of our country, have failed for several years past. It will be a most happy relief, if some new species should bring back our former success with a grain which formerly was the surest of all crops.

The *barley* some of our society have cultivated, but without much flattering success. In Scotland and other European countries it grows abundantly.

The *saintfoin*, (*cocks head*) *Hedasyrum Onobyrichis L:* is the most valuable of all its tribe, where it can be raised to maturity. It is the tenderest of all grasses, and requires the cleanest farming, till it arrives at three years old; and thereafter it is the hardiest and most durable. Many unsuccessful attempts have been made here to bring it to perfection. And yet it grows in Europe luxuriantly, where no other valuable grass will thrive. It delights in light dry and chalky soils, wherein its roots penetrate to great depths and distances—placed beyond all injuries from frosts, or vicissitudes of season. It is a beautiful flower, in the pleasure garden.

The species of *potatoe* is not unknown here. Although carefully guarded, it rotted on the passage. Its exterior was only preserved, so as to shew its size, and excite regret. It must be a most valuable root; and should be procured and cultivated.

Guillaume's plough, for which he obtained the premium from the French agricultural board, 240.

Note. The three first ploughs are worked with three horses and one man, the latter with two horses and one man.

The furrows were taken nine inches wide, and five inches deep.

Mr. Parker's double furrow plough, 500.

The two furrows 24 inches wide, and five inches deep, and the plough worked with three horses and one man.

The commencement of working with this double furrow plough was in March last. On the 21st of May, an essay was made to ascertain the quantity of ground, which could be ploughed with it in a given time.

A piece of land, 860 feet (French measure) long, and 24 feet wide, making 51 perches, (containing each perch 20 feet square, amounting to 20,412 feet English measure, half an English acre,) was ploughed in an hour, including two stoppages of the plough of six minutes, to change a bolt. The furrows were five inches deep, and 12 inches wide; the 24 feet, being ploughed by 24 furrows, or six turns of the plough. It was worked by three horses and one man, the ploughman having the reins of the horses.

A field of strong land, which was sown in 1806 with wheat, and gave 30 English bushels to the acre, was sown in April last with buck-wheat, which was ploughed in, the latter end of July for manure; has been ploughed with two double furrowed ploughs, for wheat this month (October;) it contains 25 acres, and was ploughed in six days, and one third of the seventh day for one plough to finish the two ends. This work

would have taken with the common mode of ploughing, for two ordinary ploughs, 12 days and an half, making an actual saving of a half in men and horses, both as to time and labour, and the work equally well done.*

Experiments have proved, that where the fall of rain is 20 inches per annum, as in the vicinity of Paris, the component parts of the earth for wheat, should be on 50 parts, 25 parts silex, 15 parts calcarious, 10 parts vegetable and animal matter, and argil.

The earth of a field on the banks of the Seine, six leagues from Paris, at Draveil, has been analysed, and found to contain as follows:

Silex,	25. 3
Calcarious matter,	14. 4
Water, Vegetable and Animal Matter,	8. 75
Oxide de fer,	0. 75
Alumine,	0. 57
Oxide de Manganese,	0. 01
Sulfate de Potasse,	0. 01
Loss,	0. 21
	50.

* The motive for furnishing the draft of Mr. Parker's plough, merits and obtains our thanks. The results, and his course of crops, are highly exemplary.

It will be seen that the plough which has obtained so much approbation in France, has been worked against the best English and French ploughs; and is deemed superior to them. This being the case, apparently, it cannot be accounted an unfounded assertion, that the ploughs of this country, esteemed and used here by good farmers, are equal to those of Europe. They are superior in simplicity of construction, and quickness of movement; and in efficiency most undoubtedly equal. The improved East Jersey one shared plough, with one man and three horses a breast, has performed and commonly accomplishes, all that the *Draveil* plough has done, with its two shares. Two acres per diem, at any depth from four to seven inches, is common work. Nor is it singular, for a *smart* American ploughman, with a well constructed common plough and two horses, to turn up one acre and an half per day. Two acres, and two an half, have frequently been ploughed in a day, with ploughs now very common through our country. All complexity of wheels, additional shares, and machinery, are out of use; and deemed incumbrances.

This field had been in culture the preceding years as follows:

1802, Wheat, after being pastured with sheep.
1803, Rye.
1804, Oats, with this crop the farmers lease finished.
1805, Carrots and Parsnips, for cattle.
1806, Vetches.

The American toothed sickle is better than any imported. Although in general they reap well, and use the toothed sickle; yet whole counties in England, where their agriculture and management is nearer perfection than in other European countries, have the smooth edged hook for reaping. This cuts as it enters; and scatters the grain, before it can be griped by the reaper. Here such management is unknown.

Our scythe and cradle, is far superior to any implement of the kind, used in England; though they have there such instruments.

Our necessities under the scarcity of labour, have introduced simplicity in all our operations. It would be as singular to see wheels and drivers and multiplied shares to our

1807, Wheat, 30 English bushels to the acre.
1808, Winter Oats and Rye, for pasture for sheep.
1809, Buck-Wheat &c. as above stated in the workings of the double ploughs.

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ploughs, and excite as much curiosity as would the total abandonment of them in Europe. There is no advantage over the single, in the double shared plough, in the separation of the sod, or earth. The best breaking up three horse ploughs, with single shares of 20 and 22 inches in width, elevate the sod or earth, so as that it breaks to pieces in its fall and turning; and a furrow can scarcely be discerned. Mr. Parker's double plough takes only 24 inches in width, with both its shares. Under our agricultural inferiority in too many instances, it is fortunate that we have some things for consolation. It is of no essential importance to enquire whether they were invented, improved, or adopted, by us.

Our great disadvantage is, that it is difficult to collect, and have faithfully made, implements of our best kinds. Many are bad enough, both in construction and workmanship. A plan for establishing a manufactory of, and ware-room for exhibiting receiving and vending, the best implements of husbandry, has been promulgated, which, we indulge the hope will be encouraged.

Eulogium on William West. By James Mease M. D.

Read February 13th, 1810.

Posthumous honors, whether they consisted in monuments, or in praise, have generally been confined to persons who have occupied the first ranks in civil society, or who have distinguished themselves by their military exploits or literary talents. Their examples for these reasons, are necessarily limited in their influence, because only a small number of persons can derive benefit from imitating them. Examples of virtue, industry, knowledge and usefulness, taken from the humble walks of life, are calculated to be far more beneficial in society, because a great majority of mankind are in a situation to be benefitted by them. Of this class, the cultivators of the earth are by far the most numerous. The retired life of an humble agriculturist, does not indeed admit of a display of eloquence, nor would such a display suit the speaker; but it is hoped, that a few traits in the life of one of them, will prove interesting, particularly to a society founded for the purpose of promoting knowledge, economy, and the improvement of the profession of which he was so distinguished a member.

The venerable subject of this tribute of respect was born in the county of Delaware, a few miles from the farm he owned at the time of his death. He was the elder brother of the celebrated Benjamin West, who has done so much honor to himself, and to the state which gave him birth, by his talent, as an histo-

rical painter in England.* The first years of his youth were employed on the plantation of his father, and at a proper age, he was put apprentice to a mechanic in the city of Philadelphia,—an oak cooper, at which business he continued until his 40th year, when he determined to become a farmer. The place he purchased, consisted of upwards of 100 acres, and although by nature of an excellent soil,† yet it had been so far exhausted, as to be incompetent to the maintainance of the owner, few and simple as his wants must necessarily have been.

* The family of Mr. West is traced as far back as Edward the third, in whose wars they distinguished themselves. One of his ancestors Colonel James West, after having signalized himself in the battle of Worcester on the side of the republicans, embraced the pacific principles of friends. The grand parents of Mr. West emigrated with William Penn to this country.

† The farm is situated in a tract of land about three quarters of a mile wide, which is remarkable for abounding in blue rocks of a very hard nature, and which when broken appear of the colour of newly cast metal; hence it is called *pot metal rock*; the composition of the soil of this tract is so good as to be proverbial, and in a field of a farm through which the vein partly runs, the difference in the appearance of the grain or grass on each side the line may be seen to a foot or two. The rock is the *amphibole*, or *grünstein* of mineraligists. The fact is mentioned with a view to give an opportunity of ascertaining whether any such connexion between fertility, and the presence of this stone takes place in other districts.

The business of farming may be said to have been new to Mr. West, for although he had a general idea of the common operations of husbandry, yet he must have been very deficient with respect to the various minor details upon which so much of the success and profit of a farm depend. The land he bought was almost a common: there being scarcely a fence of strength sufficient to keep out whatever animal chose to walk over his fields and they were covered with briars and weeds of every kind. In these respects his farm was not singular. All the agricultural operations of the district were the reverse of what they ought to have been, and of what they now are.—There is still much room for improvement.

After fencing his land, by substantial inclosures, and clearing it of weeds, briars, and wild hedge-rows, he looked around for information, as to the best mode of conducting his farm. He saw cattle half starved in winter for want of food, and pinched with cold from deficient shelter, and but poorly fed even in summer. Grass was the result of the spontaneous, though scanty production of the soil after the crop of grain was taken off, or in a few cases, of natural rough meadow, or watered fields, but as the first of those resources was not in the power of all, and as the latter, if within their command, was neglected from indolence, or ignorance of the benefit to be derived from it, or of the method of effecting the improvement, the provision of hay was necessarily extremely poor: the consequence was, that the stock kept was small in number, or if the vanity of shewing a large stock infected the farmer, they were of course but half nourished. In either case, manure was

scantily made. Successive crops of grain exhausted the ground: the slovenly practice of sowing wheat or rye among the standing Indian corn was universal, and the cultivation of artificial grasses especially of that great fertilizer *red clover*, which has done so much for Pennsylvania, was unknown. The cattle were therefore permitted to wander over the fields to pick up the slender provision afforded by nature, or to browse upon young twigs in the woods, to the certain destruction of the growing timber: grazing at that time was solely confined to the rich natural meadows on the peninsula, between the rivers Delaware and Schuylkill, and many farmers depended entirely upon them for the supply of their winter beef, and even for part of the hay for their live stock. In short, he found that the whole management of a farm was pursued not upon fixed principles, but in a random manner; the object appearing to be, to obtain as much from the land as possible, without regard to the preservation or improvement of the powers of the soil. With those facts before him, the prospect was extremely discouraging. He did not pretend to any knowledge in farming; but what he saw and learnt were sufficient to convince him that practices which neither enriched the farmer nor the land, could not be the most eligible, and he therefore determined not to adopt them, and as he could derive no information from his neighbours, he read what books he could procure on farming, and for the rest he depended upon his own judgment. At the day alluded to, the science of agriculture was at a low ebb in every part of the European and American world: the useful spirit for diffusing information by means of books, was not excited in this country, and even in Europe, scarcely any works of much note had appeared on agriculture, except those of Du Hamel, De Lisle and Tull. The merit of Mr. West was therefore the greater, because without the numerous helps which the modern farmer may have recourse to, derived from the works of these who have detailed the result of their experience, or from the good examples of their neighbours, he ventured to alter a bad system, and to establish a new one which the experience of near half a century in this country has shewn to be correct, and which has added to the pecuniary resources, and agricultural reputation of our State.

The chief part of the cultivated land in Pennsylvania, was in a course of tillage, and grain commanded but a small price. The business of grazing as already stated, was confined to a small district, and the inquiries he made satisfied him as to the superior profit arising therefrom, when compared to tillage. From this circumstance therefore as well as from a partiality for that pleasing branch of husbandry; he resolved as soon as circumstances would permit, to lay down his land to grass.—What an undertaking at that time! and how was this to be accomplished? the introduction of red clover had taken place only a few years before, and with the exception of a few districts, was confined to the vicinity of Philadelphia: for prejudice, the great enemy to all improvements, had opposed its progress among the cultivators of the soil. The great advantages however of this valuable grass, derived from the immense burthen which it produced, were soon seen by Mr. West, and he determined to avail himself of them.

Its fertilizing effects were the result of subsequent experience, the knowledge of which from the recent and partial use of the plant was yet to be acquired. Clover was therefore sown, and his fields soon bloomed with the novel exotic, affording him treble the quantity of hay, that ever had been known to grow in the vicinity, upon the same quantity of ground. But clover, valuable as it proved to him, and as it still is, he knew required to be renewed, and a permanent pasture was the object he aimed at, for he held it as a principle that every country was blessed by a native permanent pasture grass. How therefore was this to be obtained? it occurred to him that a visit to the peninsula, where native grasses abounded, and an examination of the soil on which they grew, might teach him something on the subject. He there saw that the whole soil was alluvial, and of course very rich, that luxuriant natural grass clothed the fields, and that the only manuring which they obtained, consisted of the droppings of the cattle; here then were the principles upon which the improvement was to be grounded. Manure was applied as equally as possible, to the *surface* of a *rich bottom.* Philosophically concluding that like causes must produce like effects, he determined to imitate the practice, and the result proved the accuracy of his deduction. The first object therefore to be attended to, was to bring his soil if possible, to the desirable state of fertility of the alluvial district, and this he knew could only be accomplished, by the accumulation of manure. How therefore was this great desideratum to be obtained, and how increased? It was clear that the wandering of the cattle over the fields and roads or in the woods, could not add to the stock of

this great requisite; for in the one case it would be lessened in quantity, and diminished in quality by the action of the elements upon it; and in the other, it would be totally lost. He therefore confined his cattle to the barn yard, during the winter, and to increase the quantity of manure, he, in the first instance plentifully strewed the yard with leaves from his woods, while the scanty crop of straw, corn blades and corn stalks, which his first course yielded, assisted in supplying food.

The sites of the old fences he had removed, the earth under the wild hedge rows which he had previously grubbed, were ploughed up, and together with that taken from the ditches he dug or cleaned out, were formed into composts containing a large proportion of lime; while every species of offal and vegetable matter about the dwelling house, and innumerable weeds while yet unripe, were added to the contents of the barn yard. He provided against drought by leading a spring from a considerable distance along his high lands, so as to irrigate at pleasure some of his largest fields. The precious water from the barn yard, which even to this day, is either entirely lost, or permitted by most farmers to run off in wasteful profusion over a particular field, was confined by the construction of the yard, and forced to increase the riches of the fresh materials which were continually in progress to the fertilizing heap. To all his grass grounds, previously cleansed of perennial weeds by fallow crops, he applied a compost manure early in the spring, always observing to accommodating it to the nature of the soil. He had the satisfaction to see the complete success of the practice. For as the artificial grasses declined, the permanent native

green grass* took their place, and only required a repetition of the practice, which caused its appearance, to insure its continuance; and for many years he exhibited the only instance in the county, of an intire sward of green grass upon an upland farm, and of fields which had not been disturbed by a plough for upwards of thirty years.

The alteration of the farming system of William West, from the random plans of the country, did not fail to be noticed by his neighbours, and in some of them to excite animadversions; and as in every instance of deviation from prevalent customs or practices, predictions of failure without hesitation, and with great confidence were generally made. The event however, proved the incorrectness of their predictions. In the short space of three years, his supply of provender was so great as to enable him to sell hay to a farmer who possessed a much larger tract of land than his own, and who had indulged himself most in objections upon "the town-man's farming." The people of the vicinity saw with astonishment, field after field, covered with heavy pasture, which formerly were distinguished by the great supply to the young people of fine blackberries; and in a few years, they were surprised to see 40 head of cattle brought to a farm to graze, which had scarcely ever afforded a bare support to ten head before; but they wondered still more when those cattle were successively led to the capital by the butcher, and moreover were informed, that a large dairy and farming stock were supported during the same season. Such a change

* *Poa viridis* of Dr. Muhlenberg.

could not fail of exciting more remarks than his deviating from the common agricultural system of the country, had formerly produced.—In the one case, some little pride was mortified, at seeing the successful practice of a citizen, in the improvement of land by courses which were so opposite to what farmers thought could not be altered for the better, or the adoption of measures which had either never reached their ears, or were slighted, from prejudice, or neglected from want of industry; in the other, the more feeling principle of interest operated to the production of remark, and to a gradual change of their agricultural operations. This change he lived to see effected, not only in his immediate neighbourhood, but in more remote places, and to behold farms, nay whole districts, brought from a state of poverty to a degree of high cultivation, by following the example he had long before set.

We are too apt to estimate the value of improvements, in a degree disproportionate to their value, when the theory that explains their success, or the practice of them has become familiar to us. We wonder that what is so easily accomplished, and is so simple, should have been so long concealed from us, or have been so recently adopted, and this remark will apply with particular force to the present occasion. The practice of producing a fine sward upon upland farms, by the application of manure to the surface, now appears so simple that it strikes us with astonishment, the thought did not occur to others at a more early period; but this wonder will cease when it is known that even to this day in many parts of the country, the benefit of it remains yet to be discovered. Men who believe the system of

farming they pursue, admits of no alteration for the better, will of course despise all information derived from agricultural publications; and those who deem it a misapplication of time, or who are afraid that it will be deemed an acknowledgment of their own inferiority to go expressly to view the farms of others, will of course long continue in the practices of their forefathers, however erroneous, and adopt all suggested improvements with caution and reluctance.

It was indicative of Mr. West's disposition to improve, and an evidence of his freedom from prejudice, that he at a very early period adopted the use of gypsum as a manure; conscious that he had much to learn, he was always on the search for information, and he no sooner heard of the beneficial effects, which had been experienced from that singular substance on some of the city lots, then he made further inquiry respecting it, and saw and heard enough to satisfy him as to its utility. Without therefore hesitating as many did, because he could not account for the theory of its operation, he resolved upon its use. The first season convinced him that it was a most important acquisition to the farmer and the experience of every subsequent year confirmed him in the opinion he at first had adopted. He defended it against the futile and weak objection which he frequently heard urged against it, that it acted upon vegetables like ardent spirits upon the human body, and like them must finally exhaust the powers of the land: he would remind its opponents of the means which it furnished of adding to the vigour of the soil by means of the great quantities of manure afforded by the additional number of cattle, which could be maintained from

the grass it produced, and which would tend far more to invigorate the soil, than the gypsum would to exhaust it. Much of the fertility to which his farm had reached, he ascribed to the use of that important substance, and his continued confidence in its powers occasioned the general and extensive use of it in his neighbourhood. The result of his experience with respect to its effects on grass, may be seen in the publication of the President of our society, and his remarks shew that he had a correct notion of the points essential to the production of its full effects, and explain the want of success which sometimes follows its application to land.

The paper alluded to contains the only literary testimonial of his attention to agriculture.* He was frequently importuned by his friends, to give to the world, a statement of the improvements he had effected, and of his practice in general, but he as constantly declined to

* This backwardness to give to the public a detail of the progress of his improvements, which arose solely from his diffidence, is the more to be regretted, in as much as they would have been highly instructive to a young farmer. Few practical men are fond of committing themselves on paper. Neither Bakewell, the well known English improver of live stock, or Klyiogg the Swiss, ever communicated their improvements to the world. But Mr. West did not like the former character, wish to conceal his operations, nor like the latter undervalue written information: on the contrary he set a just estimate upon all instruction whether oral or recorded, and often regretted the contempt in which our agriculturists in general held all information, except what is derived from their own limited circle of observation.

comply.* His uniform answer was "come and see, I can inform you more by conversation in a few hours, and by a walk over the farm, than by writing volumes." A visit to his farm was well repaid. The inquirer found always a hospitable reception, a pleasant companion, and saw every thing about the land bearing the strongest marks of industry, care and skill. The most luxuriant grass, the native production of the soil, every where met the eye; not a weed was to be seen; the fences in the most perfect order, a compost bed ready prepared or in preparation in the field next to be dressed, and every improvement effected in the most substantial manner, as if he had been just entering the farm early in life. His industry was indeed encreasing; for he held it as a point of duty, "in every man who occupies land to endeavour as far as capable to keep it in an improving state, for the benefit of himself, his connections, the public, and posterity, and he who can make an addition or improvement though small to what is already known, would be doing more good than giving alms all the days of his life."† But although he did not write for the public, he was always ready to serve it, and was often applied to for the purpose of viewing and selecting farms for those who wished to settle in the county, or called to give advice to beginners, a duty which he always cheerfully performed.

The construction of his stables, and the accommodations for his cattle, all designed by himself, are supe-

* Mr. West had drawn up the outline of a communication to the British board of Agriculture, but did not finish it.

† Address to the board of agriculture.

rior to most I have seen, and his stalls are referred to as models worthy of imitation, in two respectable British agricultural publications.*

Hitherto I have spoken of Mr. West only as a farmer. It is now necessary I should mention his merits as a man and a member of society. In these important characters he acted a part no less distinguished. He was scrupulously exact and honourable in all his dealings, and possessed a delicacy of feeling, and nice sense of honor, which we too often see wanting in men who maintain a reputation in the world. He abhorred every thing bordering on meanness or narrowness of conduct, and could not refrain from expressing his disapprobation, when informed of actions that partook of either. No man ever possessed a fairer claim to the amiable title of a *good neighbour*, and no man took more pleasure in bringing about a reconciliation between those families whose friendship or good understanding had been suspended. In the delicate and often trying situation of a divider of estates, a duty to which he was often appointed to perform, he acted with a sense of justice that always gave satisfaction. Whatever was done by him, was the result of full deliberation and honest impartiality, and therefore was cheerfully submitted to, however contrary to expectation and the wishes of a party. His benevolence and liberality were alike free as prompt, and I may add disinterested in the highest degree. More than one farm has been purchased by his assistance, and numerous instances are

* Complete Grazier, and Edinburgh Farmer's Magazine.

known to me of ample pecuniary loans, without the smallest compensation. Against this he was principled. He had known the advantage himself of some capital, in the commencement of his agricultural operations, and therefore freely advanced it when convenient to those proper objects whose necessities induced an application to him. He was of a cheerful disposition, and delighted in society, to which he contributed a great share of its charms; for he expressed himself with an accuracy of language, and precision of style, far above what might have been expected from one, whose education had been so much neglected in early life. He possessed a considerable talent for poetry, and has often in my hearing recited some of his compositions, which for imagery, and ease of versification, would have done credit to many whose fame stands high in the list of poets. He possessed all the plainness of the religious society to which he belonged, and of which he was an exemplary member, joined to the manners of the well bred gentleman.

The confidence that his fellow citizens reposed in him was repeatedly shewn, by his frequent election as a member of the legislature of this state. The compliment was the more honorable because it was never solicited. He seldom engaged in debates of the house; in a few instances however, he was induced to deliver his sentiments, and acquitted himself in so masterly a manner, as to convince his hearers, that if his natural talents had been cultivated at an early period, he would

have distinguished himself as a public speaker,* as much as he did in the peaceful occupation of an improver of land. The board of agriculture of England having heard of his superior farm management, paid him the compliment of electing him an honorary member of their institution, shortly after its establishment.

Mr. West attained the great age of nearly 84.—His mental faculties retained their full vigour to the last year of his life. By an irresistible instinct of our natures, old age in any one commands respect. But this respect is combined with veneration, when we associate the sight of grey hairs, and other remarks of the decay of the body, with ideas of virtue and eminent usefulness in an honourable occupation. Such were the feelings which the presence of Mr. West excited in every one who saw him, whether upon his farm, by his fire side, upon the road, or in company. The review of a long and innocent life is always pleasant, but when the mind in its retrospect upon past years, sees every one filled with labours for the benefit of country, family and friends, the sensations excited by it are more than pleasant,—they are truly delightful. But Mr. West had

* In one case, he replied, at the particular request of his friends, to an eminent counsellor in the house, and gave so clear a view of the subject in a short speech that the question was carried on the side he espoused, by a very large majority. His opponent, afterwards requested that the subject might undergo a private debate before six gentlemen of the bar. The proposal was agreed to, and on the discussion of the question, the vote of the umpires was unanimous in favour of Mr. West.

enjoyments of another kind in the evening of his life. They did not consist in viewing territories acquired by fraud or force, or fields stained with human blood. They were of a higher nature; they consisted in contemplating trophies of his conquests over barrenness, briars and thorns, in fields covered with the means of encreasing the subsistence and numbers of men and beasts, and in beholding the progress of improvements through the country, upon upland farms, of which he had set the example and in the tranquillity resulting from a well spent life.

After an illness of some weeks, which he bore with great composure, he calmly resigned his breath on the 6th December 1808.

If in ancient times, the birth day of that man was deemed worthy of celebration who first pressed the grape, and taught man the use of its intoxicating juice; surely the memory of our own countryman will be held in grateful remembrance by posterity, when it shall be known, that he greatly contributed to increase the solid riches not only of our state, but also the wealth and comfort of the farmer, which of late are so apparent, by the agricultural improvements he introduced, and by shewing how the earth may be made to produce a greater increase by the judicious application of labour.—In the domestic circle, we dwell with pleasing satisfaction upon the recollection of those departed friends, who have endeared themselves to us by good offices, virtues, and the kind courtesies of life; the patriotic mind will derive still greater pleasure from the consideration, that a long and active existence had been spent in labours calculated to promote the interest of the community at

large, by improvements in a calling particularly suited to the genius and habits of the people; and the friend to religion and morality will feel happy in the knowledge of the fact, that with such great personal merit, the respected subject of this tribute was strict in the discharge of every duty, to that BEING from whom all goodness flows.

On Mildew. By Timothy Pickering.

Read March 13th, 1810.

Washington, January 1*st*, 1810.

Dear Sir,

In a conversation with you on mildews, I mentioned a short but very ingenious dissertation on that subject, which I had often quoted on the like occasion, and which I promised to send you. It was published in a Boston newspaper in the year 1768; and the papers for the year being bound in a volume, it was fortunately preserved. A few days since I received the inclosed copy, transcribed at my request. It gives the only satisfactory solution of the phenomenon of mildews that I have ever met with. Sir Joseph Bankes's discoveries (admitting their reality) did not abate my faith in the correctness of the "New-England-man's" theory. Sir Joseph's (to the naked eye) invisible seeds of *fungi*, find, in the extravasated juices of the leaves and stalks of grain, a *bed* adapted to their nature, in which they vegetate. Those seeds, floating in the air, and striking against the clammy juices of those plants, would of course be there held fast and take root.

If you have visited the woods of Pennsylvania in the spring, you must have noticed the *rusty* appearance of the sap (particularly I think of the sugar-maple) oozing from the stumps of trees felled not long before, and covering the tops and sides of the stumps. Of the same colour, you know, is the newly extravasated sap on the

stalks of wheat and other grain when struck by the mildew.

You have seen many statements by American (and I believe British) agriculturists, of wheat being reaped while the grain was soft and milky, and the plants still green, or greenish; which nevertheless produced, if not a full sized, yet a tolerably plump kernel, and yielded a very fine and uncommonly white flour. It has been as often said by the same agriculturists, that by such early reaping of grain, *on the first appearance of mildew*, you may obtain a valuable though not an abundant crop; the sap in the stalks continuing its natural course to the heads: whereas if the same grain remained uncut, the seeds would be shrivelled, and often give chaff only instead of flour.—How is this to be accounted for? The answer which has occurred to me, and which I will now state, while it furnishes an explanation of the declared fact, goes to confirm the theory of my country-man in the paper inclosed. It is this:

The stalks of grain being severed from their roots, the source of the malady is cut off. The vessels of the stalks are no longer distended by a *superabundance* of sap ascending from the heated soil—they cease to receive any. The bursted vessels, through the wide breaches in which, the sap, in its rapid ascent, was rushing, naturally close; and the sap already received into the stalks (further aided perhaps by dews) pursues its gentle course to the heads, and fills the grain.

The writer's remark, that grain in old fields which have been often dunged, is frequently mildewed, while that on new land escapes (for which, on his hypothesis, he assigns a natural reason,) comes in support of your

opinion, that long and new dung is injurious to grain-crops.

I promised to give you an account of my experiments in cultivating the common field-peas, some twenty years ago at Wyoming, in which they were entirely free from bugs: but this I must postpone for the present.

I am, dear sir,

Faithfully yours

TIMOTHY PICKERING.

RICHARD PETERS ESQ.

From a Boston Newspaper printed in March 1768.

Some Thoughts upon Mildews.

As the public are now, on all sides, calling upon every one to communicate his observations upon any thing which relates to agriculture; perceiving in reading M. Duhamel's husbandry, that there are a great variety of opinions, about the *nature* and *cause* of *mildews* upon grain, even among the most celebrated gentlemen farmers in Europe; and desirous, if possible, to contribute my mite towards any useful discovery; I have ventured to shew my opinion, founded on such observations as fully satisfy myself; as it appears to me perfectly to correspond with *facts;* and in a natural and easy way to account for every appearance and effect of that disorder in grain.

My fixed opinion then is, and long has been (in which I since find I agree with the famous M. Chateau-Vieux) that the powder which forms the *rust*, called *mildews*, is the extravasated juice of the plants dried by the sun, upon the stalk.

My reasons are these, 1st. The grain, we see, receives no more nourishment after it is violently struck. 2d. On a careful inspection, it appears that some of these rusty blisters are actually under the outer coat or skin of the stalk, and do not appear to have any communication from without, others are only split in the middle, some more and some less, and the rust appears on the outside more or less according to the opening. 3d. The learned Mr. Tillet (Duhamel tells us) with a good microscope, actually saw the juice issuing from these small openings, over which he still perceived some pieces of the membrane which imperfectly covered them. This methinks must give occular demonstration. But the two former satisfied me, the second especially appeared demonstrative.

The true *cause* of this *extravasation* is next to be inquired into. This no writer that I know of has hinted. I take it to be this, *a sudden obstruction of the juices of the plant, by a very cool night, after several days and nights of very warm weather.*

By a continued heat, the earth is warmed to a great degree, and all nature invigorated; this occasions a great ascent of the juices, so that every vessel is full (as in an animal of a plethorick habit when all know there is most danger of the vessels bursting;) a sudden cold ensuing at this critical season chills the tender

stalk, and most where it is slenderest, and there brings on a stagnation.

But the earth, being deeply warmed by the long and intense heat, not cooling so soon as the stalk, continues the violent ascent of the juices as before; and if there be an obstruction or stoppage above, in the slenderest part of the stalk, what must, what can be the consequence of this but an *extravasation*, or that the vessels burst?

That in fact mildews in New-England always come in cool nights, after intense and continued heats, I am sure from near 40 years observation, and from these symptoms I have often known a mildew prognosticated by observing persons, in the evening preceding.

Such a cold, succeeding heat, every philosopher, and almost every man, knows will occasion a great dew. And this no doubt is the reason why this rust has been ascribed to the *dew* and called *meldew* or *mildew*. Whereas I suppose it was the *cold*, properly speaking, which occasioned both; and that the *dew* had no other effect in occasioning the *rust* than, as by hanging on the stalk, it may increase the chill.

Another fact which, I think, confirms this hypothesis is this: that the *thin leaves* and the *slenderest* parts of the stalk are always first affected: on the stalk the spots first appear just below the ear. Here the stalk being smallest and the vessels narrowest, is the first stoppage by the chill, as might be expected. And accordingly just below this the first eruption appears; and so lower and lower, till, without relief, it covers the whole and entirely ruins the grain if not already filled.

It is another well known fact, that grounds in our *new settlements* are much less exposed to mildews than in our old plantations which have been often dunged. The reason of this is plain upon this hypothesis, for dung heaps are known in summer, to receive and retain a much greater degree of heat than common earth.

There can be no doubt therefore, but that dunged lands do the same in proportion to the dung, especially the new dung, laid upon them. And if so, it must occasion a more violent ascent of the juices, and so the stalk will be proportionably in more danger of bursting, and of an *extravasation* of the juices, upon a sudden chill in the stalk.

Another fact commonly observed is, that *high grounds* are not so exposed to mildews as lower. The reasons are plain upon this hypothesis. 1st. Because there is not so much difference between the weather in the day and night on high grounds, as in the lower. 2d. Because the greater *motion* of the air in the high land, may in some measure prevent the stagnation of the juices.

But most of these things are very hard to account for, upon any other hypothesis I have ever seen.

Upon this plan too, an *high wind* will be likely to prevent a mildew; and accordingly, I think, they are never known to come in a windy night, though cold. And a *shower*, or a *rope* passed over the fields, at this time may do some service: as the washing and cleansing a sore on an animal, or as any kind of motion in case of stagnation of the blood and juices of our bodies.

But though I take this, for the reasons given, to be the true *cause* of what are called *mildews;* from the

knowledge of which, it has been hoped some *remedy* might be investigated; yet here I must own my ignorance; and leave it to some more happy genius to bless mankind with a *remedy*, if providence permits any.

I am not certain of any worth mentioning: but presuming upon the candour of mankind for my good intention, whether I do any real service or not—I would just hint at two or three things.

1st. If the unhappy night or nights can be prognosticated from the symptoms abovementioned, possibly a *rope* moving over the field, and stirring the grain all the night might be of some service, though I think shaking off the dew in the morning can be of but little,

or 2d. In the woods where brush is plenty, the burning of heaps of brush on the windward side, so that the smoke shall pass over the field, and soften the air, might very probably be of service.

Or if by any means our land could be kept strong enough to produce the grain most exposed to mildews without dung (or only very old dung were used) I have no doubt, but it would be of great service from the experience of our new settlements, where, so far as I can learn, they rarely have mildews to hurt them, as I hinted before.

But as our mildews in New-England most commonly come about the beginning of July, the only thing we can depend upon at present, is the using every method

to bring forward our grain as early as possible that it may be *full* and *ripe* before the common mildews come.

A New-England-man.*

* I never knew who was the author of this theory of mildews; but am inclined to think it was Peter Oliver Esq. then a judge of the Superior Court of Massachusetts. Two or three years after its publication, I became acquainted with him. He lived in the country, and was fond of agricultural enquiries and pursuits. To him also, I believe, the public was indebted for a second edition of the Reverend Dr. Elliot's essays on field husbandry, written more than sixty years ago; the earliest American production on the subject.

T. P.

1st, January 1810.

It is agreeable to know, that our countryman has long since anticipated the ideas of the modern agriculturalists of Europe. The frequent injurious effects of new dung upon grain, especially wheat, are now fully ascertained, and were mentioned in our first volume, in the paper on "smut in wheat."

The proposition of the rope to agitate the grain, and shake off the dew, has been *recently* proposed by British agricultural writers.

J. M.

Notes, on Mildew.

I cannot reconcile to my ideas of the well known intelligence of the celebrated *Arthur Young*, his eulogy on the "*use of long fresh dung, in preference to that which is rotten;*" but by presuming that its failure in success here, is owing to the difference of climate. See his lecture, read before the British board of agriculture, May 26th, 1809. Pages 46, 47; where he says, "*were the practice general, it would add above 20 millions Sterling* to the produce of the kingdom." Could I hazard the imputation of presumption, in setting up my limited experience against an authority so truly respectable, I should doubt the soundness of his calculation, even in England; but in our country, and *especially on loamy and light lands*, I should directly reverse his position. As Mr. *Davy* has joined in the sentiment, it must be *chymically* right. But from every observation I have made here, either on my own, or the lands of others similar to mine, I cannot hesitate to say, that, in this country, it would be *agriculturally* wrong. If it ever succeeds it must so do, in wet, cold, *clays*. It will be recollected, that I always distinguish between *hot*, *long* and *fresh* dung, and that sufficiently prepared, by a due fermentation and putrefaction, before it is applied. *Over-rotted dung*, I never approved of. There are, however, here, advocates for long, fresh, dung. I have seen the most vigorous vegetation layed; or end in blight, smut, or mildew; and their grounds filled with weeds and vermin.

R. PETERS.

On Salt as a Manure. By Richard Peters.

Read March 13th, 1810.

Belmont February 15th, 1809.

Sir,

As agricultural occurrences turn up, I mention them, that we may preserve them; for use, or consideration. A Mr. *George Redd* of Frederick county Virginia, called on me with a little pamphlet he has published; entitled "A late discovery &c. relative to fertilizing poor and exhausted lands," &c. I found this "*late discovery*," consisted in the use of *common salt* as a manure, applied in small quantities. His means of discovery were, at first the accidental observations of the moisture produced by salt in the driest seasons; and the great resort of earth worms, to places on which pickle or salt had been thrown. I know that those worms are attracted to such places; but if they remain but a short time there, they die. I told him, that when a boy, it was my habit to sprinkle salt, or salt and water, in dry seasons, to cause the assemblage of earth worms, and furnish myself with bait for angling; and I was never disappointed. I related my frequent experiments with salt, on acres divided into square perches, at rates from 20 pounds to half a bushel per acre: and my frequent top dressings in every way.* And although I found the smaller quanti-

* These experiments were made, and often repeated, more than 30 years ago. Occasionally I have since tried some of them. But I have never been encouraged to pursue the practice to any great extent.

R. P.

ties the most successful, I had still doubts about its general utility, as a manure of any certain efficacy. I read to him, from page 171 of our memoirs, the opinion I there give in these words. "It is not well ascertained that *common salt (muriat of soda)* is a manure. If it is, it acts by its septic quality, when applied in small quanties." His exclamation was—"Then it is a manure, and acts as thou hast supposed," I know it by numerous facts, and profitable experiments." He is not a farmer by profession; and his pamphlet shews him not to be acquainted with principles of the art. His theories are heteredox and whimsical. Among other improprieties, he proposes the mixture of salt with gypsum;—decidedly ruinous to both. He has a small farm; but is a mechanic;—I think in wire work. His facts are worthy of attention. He ploughs in the fall; or, if practicable, in the winter, and early in the spring. There he falls in with my experience; and probably this may be the secret, in a great measure, of part of his success. The strewing the salt must be before vegetation begins in the spring; and never to exceed one bushel per acre, either in substance or diluted with water, and mixed with two bushels of "virgin mould where fallen trees had lain and rotted, or from marshy land, or slackened ashes." The compound must be dry and friable. His average per acre seems to be three pecks of salt, mixed in the compound, so as to facilitate its being the better and more equally strewed. He applies it to all vegetable products; whether on the farm, or in the garden. And he gives instances of happy effects in the orchard; and on all fruit trees. He deepens his spots where Indian corn is planted; and puts therein a table spoonful of

salt, or an handful of the mixture. He is a friend to moderate steeping of grain in weak salt and water, for seed; but not to brines, strong, or long continued, as steeps. He has applied the salt, or mixture, to *cotton*, with great success; and says, "The same mixture will answer equally well for wheat, rye, corn and tobacco." Also hemp and and flax are benefitted by either the salt alone, or the mixture. It does not succeed on clay soils, not well pulverized. He gives instances of great improvement by sowing a bushel of salt per acre, or that quantity in his compound, on grass lands. He told me that Lord *Fairfax* in *Virginia* practised this many years ago on timothy grass, and doubled its product; as he was informed by an old servant of that nobleman. I give you this account from his pamphlet, and conversation. He reprobates all applications of salt in large quantities; as being as injurious, as are the smaller portions beneficial. He top dresses with salt, or the compound, at the rate mentioned, all crops of either spring or winter grain; and prefers strewing it in moist weather. He says that others in his neighbourhood are in the practice, which is gaining much credit among those who adopt it. I think it best to make trial of his suggestions, though his panacea seems good for too many things; and have no reason, *from his appearance*, to doubt the verity of his facts. Be they ever so apparently improbable, the experiment will cost little, of either labour or expence. The gantelope I ran, in early life, under the lash of prejudice, when, almost alone, I began to disseminate the uses and efficacy of small quantities of *plaister of Paris;* has taught me never to treat with neglect or contempt, relations of experiments in hus-

bandry; though they may appear improbable, or be unaccountable: especially when the test is easy, and cheap. Lord *Dundonald* condemns *salt* in large quantities; but mentions the profitable use of *sea water;* in which there is only one bushel and an half of salt to the ton. *Darwin* is opposed to the use of salt as a manure. Nothing can exceed the improvement made by the hay of our salt marshes, applied as manure. Plaister will not succeed, where this hay is used.

An old farm-servant reminds me of a remarkable fact. He was employed in my experiments with salt; and scattered it in broad stripes across fields, in various quantities. The salted stripes were visible at great distances, especially in winter; being free from hoar frosts, or slight snows; when all other parts were covered. Nor would severe frosts operate so much on them, as on other parts. They continued open, dry, and free from frost, when all the surrounding grounds were deeply and firmly frozen. He says I strewed salt around fruit trees; to keep off frosts, and increase their vigor. But in some cases, having salted too heavily, the trees were injured. In others, it appeared to be very salutary.

I am, Sir,

Your obedient servant,

RICHARD PETERS.

DR. JAMES MEASE.

Secretary of the Philad. Soc. for promoting Agriculture.

Notes,

Salt has long since been used as a manure, and various accounts are before the public, of the success attending it. Flax especially is greatly benefitted by a slight quantity.

J. M.

I have (in this early part of the season,) spread salt in the way, and in the quantities mentioned by Mr. *Redd*, on every species of crop, both grass and grain. We have had an unfavourable spring owing to a long drought. I have perceived no effect, good or bad, from all or any of the applications of salt. On my wheat I had some appearance of benefit, but it was not decidedly clear. So that if it succeeds with others, I have my usual bad luck. It is my intention to repeat the experiment.

R. P.

July 13th, 1810.

On Tough Sod, Star of Bethlehem, and Blue Bottle.*

By Richard Peters Esq.

Read March 13th, 1810.

In the autumn of 1808, I ploughed my little trenched field, in which I raised the hemp (mentioned in our Memoirs, page 244,) from five to seven inches deep. The sod was tough; and the surface much bound. I treated it as I have been accustomed to deal with similar soddy leys. I harrowed it frequently in the fall, and, in open weather, in the winter, in the direction of the furrows, to expose the garlick, and fill all openings admitting too great influxes of air. To close them, and consolidate the mass, I rolled it well; and thus it layed through the winter. The *spiky-roller*, an implement too little known or used in this country, and without which no farmer of heavy or clay lands can do justice to his husbandry, would have been the best for this operation; though in light lands it is only occasionally required.

Those who do not follow my practice in old leys newly broken up, object to *fall ploughing;* because, in the spring after fall ploughing, they cross-plough, and turn up the sod with all its pests and adhesion. This I never do, but harrow it well and often; sometimes with a harrow, furnished with numerous hoes instead of tines, for my spring crop. I marked out the field in squares for Indian corn, and planted at the usual time; not disturbing the sod, except in a small part of the field, here-

* *Ornithogallum umbellatum.*

after noticed. The corn thus treated does not, at first, grow so vigorously as in the common way. But as soon as the roots have penetrated the rotting sod, and mixed with the putrefying vegetable substances, the plant is wonderfully rapid in its increase, and in its improvement in colour and vigour. When the corn requires ploughing, the sod is completely decayed, and becomes a manure.

I was truly mortified by the discovery in this field, of a new enemy, which defies all my efforts to subdue it. Mixed with some compost, made, in part, of the cleanings of my garden, which had been spread several years, were a *few bulbs* of that most destructive and unconquerable pest—the *star-hyacinth** or *wake o'days*, as it is vulgarly termed—from which the increase has become ruinously great. It has resisted the attacks of two winter exposures; and I can now pick off the surface, the bulbs unhurt, although those of the *garlick* are destroyed in their immediate vicinity. I have left no endeavour for their extermination untried. Intermixed with them are many of the garden *blue-bottle;* also a nuisance almost as indestructible, though not so prolific. It is dangerous to mix the cleanings or offals of gardens, with composts intended for the fields. Flowers innocent and grateful in the parterre, are often pests in the field. But the one now mentioned, does not always thus originate. I have brought this subject into view, to *gain* more than *give* information. On inquiry I am told, that thousands of acres, through the country, are

* *Star of Bethlehem.*—10 *o'clock.*

rendered worthless by this *agriculturally* vile plant. *Botanically* I find it a favorite with our highly intelligent member, professor *Barton;* who looks only at its good qualities; with which I am willing to dispense, if it could be entirely rooted out of our country. I know nothing but *paring* and *burning*, that will subdue this foe. This I should have done; but my public engagements, at the proper season abstructed me from such employment. This practice being unknown here I wished personally to superintend it; to prevent (as much as in me lay) failure exciting prejudices against it.

In the spring of 1809, I determined not to be outdone; and took the resolution to hand weed an acre of the worst part of my field. I turned in the plough; and had a man, to lead boys, in hand weeding after the plough and harrow; but could not get through above half the acre. From this I collected, in repeated ploughings and harrowings, at least *one hundred* and *fifty* bushels of bulbs; estimated on a computation of the loads of a measured cart body. I should have persevered; but the boys grew tired and abandoned the task.

Until my disaster, I had no idea of the extent to which this destroyer has spread it ravages. I hear of it from numerous quarters of the old settlements of our state. It has even been *indulged*, in grass grounds and meadows. Those who admired its insidiously modest and bloomy whiteness, did not perceive the ruinous pleasure they enjoyed. It exhausts far beyond *garlick;* though it does not nauseate the crops. Meadows and fields, once fertile and productive, are rendered by it barren and worthless. I earnestly wish that our farmers would take the alarm, in due time to arrest the progress

of this very destructive plant; which has hitherto been too much overlooked and disregarded. All I can do, until I pursue farther means and experiments, which I shall not omit, is to give solemn warning!

In my attempts to detach the roots from my field, and assist the weeders by frequent stirrings with the plough and harrow, I have a confirmation of the usefulness of my practice of rotting the sod. In the spot so often ploughed, the old vegetation dried, and perished uselessly, and the Indian corn was strikingly inferior to that on the rest of the field. The whole crop, although at first unpromising, was abundant; and exceeded the general rate of crops of my tenants and neighbours. The season was not very favourable for corn. My field remained remarkably clean, and free from weeds—an advantage attending this mode of treating soddy grass-grounds. The corn stalks having been carried into the barn yard, the field is now winter-fallowed and limed; in preparation for field pease, potatoes, and other ameliorating crops to precede wheat. It is in fine tilth; and all the former cover of grasses, and other common vegetation (with the exception before stated) entirely rotted, and mixed throughout the ground mellowed by the culture, and very promising in its colour and loose texture. The *garlick* I do not fear; but too many of the other bulbs remain to annoy me. An *early spring ploughing* will, under its present fitness for it, be highly serviceable, and complete its tilth. This will

now do as much good, as one immediately succeeding the first fall ploughing, would have done mischief.

RICHARD PETERS.

Belmont, February 19th, 1810.

To the Philadelphia Society for promoting Agriculture.

I know other farmers who practice rotting a sod, to this effect; though not exactly in this mode. I have heard of none who can destroy completely the bulbous pests. If any there are, they cannot do a greater service than they will render, by communicating their practice.

R. P.

April 2d, 1810. Several clusters of the bulbs of the *Star-Hyacinth*, which have been exposed on a flat stone (with no earth but the small portion which adhered to them) to all the winter frosts; are now vigorously shooting; uninjured by all the past inclement season. Having been informed that sheep would eat these bulbs, I turned in my flock, when the ground was covered with them. But they will not touch them; nor will swine.

R. P.

These clusters remained alive until the beginning of May; when they perished.

R. P.

Some Observations on Fruit Trees. By Edward Garrigues. Of Kingsess.

Read March 13th, 1810.

On the 6th day of the 5th month, 1803, the frost was so severe as to destroy the tender shoots of the apple trees, which at that time had extended about four inches, and the fruit as large as a small hickory nut; this frost being succeeded on the following night by a heavy fall of snow, so as to break the branches of many tender or soft kinds of wood,—left but a slender hope of fruit for the succeeding autumn; but, contrary to my expectation, one of my orchards produced at the time of gathering, 60 barrels of good pippins, and about 1000 gallons of best cider, while the other orchard which is nearly adjoining at the corners, did not produce one peck of apples either of summer or winter fruit, although of the same kinds of fruit as the first mentioned orchard. This excited some attention to the circumstance attending the cold, which came from the north-east, and their being some shelter from that wind afforded the orchard which produced fruit; induced the belief, that when the east wind prevails, and the orchards are exposed to its biting effects while in bloom, or the fruit but small, more danger attends the expected crop, than from colder weather from other quarters. I would therefore prefer planting some kind of shelter, to orchards, which may be exposed to the east winds, as an expedient to counteract, its baneful influence.

Would it not be found expedient to take off a large part of the superfluous wood, that often overloads our

peach trees, as well as the frequent superabundant fruit that is often afforded at the same time, so that frequently where there is no worm in the root, the tree is prematurely exhausted by over-bearing of wood and fruit? Having planted some of the finest peaches that I ever saw growing, and while loaded with a very promising crop, by a sudden gust of wind, during a thunder storm, one of them was completely stripped of all its limbs—after which it put out, and the succeeding season, while all its companions in years were dwindling by their excess of bearing the preceding year, this one proved and continued for several years a good bearer, of the red rare ripe kind.

We may observe by the flowering almond and divers other shrubs or trees, that when nature offers an exuberant crop, that the plant, or roots are so enfeebled thereby, as to exhibit some doubts of the surviving of the plant or tree; this induces me to suppose that we frequently blame the worm, as a known ravager of the peach trees, when perhaps, very many of them die by our want of attention to them. I have (as yet in vain) attempted to stimulate some of my friends in East Jersey, to attempt a peach orchard in the sandy pine lands, which I have great reason to believe would amply repay all cost for the essay, by affording perhaps the finest fruit, known to us, in this western world.

Thou will readily observe my dear friend this hasty sketch is only offered, as hints for the excitement of some who may be disposed to appreciate the advantages of good fruit; not only for themselves, but believing when not abused by distillation, a blessing to our favoured country; hoping that some of your society will

continue to favor others in different situations of life, with the result of their experience for the general good.

I subscribe myself, thy assured friend,

EDWARD GARRIGUES.*

Kingsess Farm, 2d month 23d, 1810.

DR. JAMES MEASE.

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* Mr. Garrigues's communication is acceptable in itself, as well as because it is among the very few attentions paid to our earnest desire to gain and promulgate information on the subject of fruit and fruit trees. European books will not suffice to satisfy our minds; because our climate and circumstances vary from those of the other hemisphere. There is no greater mistake, in any country, than cutting down woods or hedge rows, which afford shelters against bleak and noxious winds. *Millar* in his Gardener's Dictionary, has some excellent remarks on this subject. The fact of the utility of shelter, mentioned by Mr. G. has been frequently observed, but seldom in so remarkable a degree. His fact as to the peach tree, accidentally stripped of its branches, deserves attention. There are so many misfortunes attending this species of tree, and so much has been in vain attempted to establish some general rules for its culture, that we hesitate to pronounce any decided opinion. Some have asserted that the knife should never be applied; while others support the necessity of the free use of it. It will be seen in our first volume, that, to the southward, where it flourishes extensively, it is chiefly left to nature. And it is most probable, that it will be very difficult to establish any certain rules, by which this short lived tree can be cultivated here, with well founded expectation of profit or duration.

See our first volume, pages, 11, 15, 17, 21, 120, 183, 273.

On Oat Pasture and Improvement of Soils. By William Young. Of Delaware.

Read March 13th, 1810.

Rockland Farm, March 9th, 1810.

Sir,

In compliance with your request, made a considerable time ago, I have inclosed a narrative of the *oat pasture;* and several circumstances under which it has been introduced, with immediate advantage, to the live stock and worn fields.

I have endeavoured to copy it from the fields themselves; I have however, designedly as it were gone back, to give another view, of some circumstances which are deemed important, and not with a view to overcome your patience, but to remove doubts, and introduce the experiments before you, in a different point of view. The inferences respecting the advantages, or use of the oat pasture, have been, and still may be deemed a whimsical expedient to spend money; it may be ridiculed by others. But as it has outlived, and overgrown every thing of that nature here, there is some hope, that it may become indigenous elsewhere: it has been weighed for years under hopes and fears. Not that I dread criticisms, made under circumstances which offer a hearing, in private, and before the public tribunal, on equal ground, foot by foot, with the critic. It would give satisfaction to convince, or to be convinced. Improvement is the goal towards which I bend

my course. If a new path shall be pointed out, and which has with greater advantage been trodden for several years, and with a greater number of simple facts to recommend it; it will be cheerfully followed. Otherwise the course now beaten by some years experience, cannot be abandoned.

I am most respectfully yours,

WILLIAM YOUNG.

GEORGE CLYMER, ESQ.

Vice-President of the Philad. Soc. for promoting Agric.

It is generally acknowledged, that the best land may be reduced to sterility, from an injudicious rotation of crops. It remains in a great measure to be proved, whether a farm, which from bad management had been rendered barren, can be restored to its pristine fertility, by a treatment, not beyond the reach of every farmer, (nor without the farm) who possesses the land, free from incumbrances, which are nearly equal to the supposed value of his worn out farm.

When an enquirer examines the publications of those, who have given the results of their experiments; it appears not only practicable, but easy: frequently however, some circumstance is not mentioned in the communication, or some thing not attended to by the reader, who intends to make the same successful experiments, but fails, from the causes stated.

The Rockland farm, exhibited a subject for experiment, as it had not only been reduced by cropping, but generally, became a common for every animal, to take what remained of the scanty natural, but coarse herbage: having read in various books the result of sowing plaister and clover, it was presumed, that sowing plaister and clover, would be the extent of the expences, required to fertilize the fields, in a few years;—a few experiments, proved that the plaister and clover seed were both lost, as no one could at any season of the year, point out what field, or upon what part of any field they had been deposited, unless where the briars and bushes had been eradicated.

It should however have been mentioned, that the soil was generally a cold or heavy clay, some blue, white, light brown and a few spots of red clay, loaded with hard blue stone and rocks, chiefly quartz, mixed with iron, and copper. Some of the experiments were made with plaister, others were made by top dressing with lime, at the rate of twenty-five, to thirty bushels per acre: the lime was brought 20 or 25 miles from the kiln, and laid on the field at 25 cents per bushel: it was formed into a bed of about half a foot thick and covered with earth, ploughed and thrown over it, before it was slacked, that all the phosphoric principle disengaged by the water, might be united with the earth which covered it; a heavy harrow was afterwards passed over it, so soon as the shell was reduced to powder; the bed of lime and earth, was then frequently turned by the plough and harrow, until the whole assumed, the appearance, and smell, of soapers ashes, containing about ten parts of common soil, to one of lime. It was

then carted, and spread regularly over the field, and in every instance it gave a return of clover, equal to ten load of stable manure to the acre. The idea of mixing the lime and earth, was suggested from spreading the refuse mortar of lime and sand gathered from about buildings and laid upon the field, the effect of which I observed was more immediate than any equal quantity of lime: though mixtures of lime and earth, were equally so,—in both cases, the lime was completely pulverized, and the sand and earth, broke up the communication of lime with lime, and the succeeding rains carried the fertilizing principle of the lime, as from a sieve, into the soil where it was spread,—it completely divided the soil, rendering that open and warm, which before was compact, and too cold for the roots of the grain to live in.

The whole soil which before felt dead under foot, became so elastic that persons of observation by walking over the field in the night, distinctly told how far the lime and earth compost extended. The colour of the soil was likewise changed into that of chocolate.

These effects presented several ideas, which had not occurred to me before: viz. That any thing which would separate the particles of the soil, and admit the air, would render these cold and heavy clays, warm and fertile; —that the free intercourse of air, would carry off the acid; to meet this, ploughing in the fall was adopted, and found successful; one half of a field six years ago was ploughed in the winter, the other half ploughed in the spring, that part which was ploughed in the spring, has never brought grain, or grass, equal to the other. It should have been observed, that the field had not

been ploughed for upwards of 20 years, and of course a great body of rubbish and roots were ploughed in, after the briar-hook and grubbing-hoe had smoothed the surface. Spreading of manure in the autumn, from the compost bed, has also been introduced with universal success, both upon grain and grass fields, the lye or salts, of the manure, being carried into the soil by the rains upon the breaking up of the frosts, which have in some measure prepared the soil to receive it. High agricultural authorities, even bottomed on accurate observation, are opposed to the practice of spreading out manure in autumn ; amongst these we find the justly celebrated Lord Kaims, in his gentleman farmer, a work upon first principles, and deservedly of the highest authority. A departure from his judgment is only to be allowed, where facts would censure silence ; nor should his name have been mentioned, unless to avoid the charge of writing without attending to what has been said on that subject ; it is no conclusive objection that "the strength of the manures, will be carried off by winter rains, or exhausted by the frost :" are not the warm showers more so, and are not the exhalations more copious in a warm than in a cold temperature ; is the descending of the sap in trees no monitor, as to the season for spreading out manures, and about the operations of nature, for renewing, and invigorating, the process of vegetation.

Briar-bushes, and all vegetable substances have been covered up with earth, rotted and used with the same success, as stable manure, and so far, and so long, as they separate parts of the soil and admit the air, they fertilize and change the colour of the mould. These

experiments tested by frequent repetition, have laid a foundation for experiments less expensive, and equally fertilizing, for the production of grass, and grain.— *Ploughing* and *sowing, for the purpose of producing pasture*, and *accumulation of vegetable soil have been adopted:* for this purpose wheat, rye, Indian corn, (maize,) buckwheat and oats have been sown upon fields ploughed, which were incapable of producing any crop ; none of those grains, have produced pasture and vegetable soil equally valuable, to that from the oats : where the others have failed, its roots have *pierced*, *disarmed* and *vanquished* the *inhospitable soil* and rendered it fertile ; the winter ploughing is continued, and the oats are thrown in, as early as the season will allow, sometimes even in February, either upon what has been ploughed in autumn, or in the fields which were in corn the preceding year, or in pasture oats, the preceding fall. In general they afford early pasture, and when they are reploughed in July and August, and sown again with oats, they furnish excellent pasture from early in September, until late in December, during that season when all other pasture is generally dried up. The first sowing of oats only gives about two months pasture, but the roots and remaining herbage affords a manure for the second sowing, and this always yields four months valuable pasture,—which no other course known to me will afford. In September, October, November and December,—considerable attention is required, to preserve the young clover, which the field will be able to raise in the second year of the oat pasture : if sown with the oats in the spring, the cattle should never be put in while the ground is too moist, as they would destroy and

tread it into the soil; and sometimes dry seasons are also highly injurious to the clover. When the clover is sown with the second sowing of oats, the same care is required to prevent its being trodden in by the live stock, for this purpose it is always necessary to have a spare field of old pasture, which they will feed upon in wet weather, and which they would not relish in dry weather. To guard against a dry season it is most proper never to pasture the oats, where the clover is sown, so much, as to prevent the herbage of the oats from giving shade to the clover. So soon as a field will produce clover luxuriantly, there is no farmer at a loss how to make his field as rich as he pleases and having got them into good heart, it will be his interest to put them in such rotation, as shall increase the vegetable soil and consequent fertility of his fields.

It is almost unnecessary, to mention, what will make its way to the understanding of every farmer, viz. The many advantages gained from treating his barren field in this way.

1st. Early and late sweet pasture from such fields, which otherwise produced a scanty course herbage unpalatable to every animal.

2d. Immediate reward for his labour; the stock are supported by it within two months from the time seed is sown: the two returns give six months green food; he is not however to depend upon it for all his summer pasture.

3d. Perhaps it is one of the most effectual means to root out garlick, because what have escaped the plough in the spring, are eaten down with the pasture from the first sowing of oats and prevented from going into seed:

the ploughing in July and August expose so many of its bulbs to the sun that few shoots are to be found in oats sown for fall pasture.

4th. It is an easy and profitable way of clearing grain-fields from every species of injurious weeds; as it will convert them into vegetable soil, and enable the farmer to raise whatever grain or grass he shall judge most suitable to the soil.

5th. It will save the expence of a fruitless summer fallow, and the green herbage will aid the dairy.

6th. It enriches the farm from within itself, and no expence is required beyond the reach of any farmer: by rising one hour earlier, and working one hour later than usual, for two weeks, he may plough, and sow two acres, as an experiment. The pasture will recompence his labour, while his soil is greatly improved; it is equally evident, that the fertility of the soil is acquired, partly from the roots of the oats, opening the soil and introducing the air, and warmth, of the sun, and partly, from accession of vegetable soil, produced from the decomposed roots of such pasturage; but even before the roots are converted into soil, they produce the most beneficial effects. Those from the spring sowing, retain the moisture, and supply the summer sowing with it. The roots from the fall pasturage, being full of sap, introduce winter frosts every where, into the soil, which swelling with the congealation, separates the particles; for it is to be observed, that roots while the stem is eaten down by the stalk, do not become hard but are more numerous, than when the plant is matured into grain. It is however necessary to sow at least double the quantity of seed, to that required for crops of grain,

the pasture being so much the thicker, and the increase of vegetable soil from the decayed roots so much the greater.

It is not to be expected, that one or two repetitions of the series of oat pasture, will make the soil equally rich as a common dressing of stable manure, which from a farm of 100 acres, will not in general extend over more than 10 or 15 acres; this gives to one acre nearly the vegetable soil produced from seven or 10 acres.—It is to be remembered, that the object proposed was to render worn out, or barren fields productive; and in no case have I found a field, which was not after two years oat pasture, capable of producing clover, and receiving the gypsum with evident advantage. So soon as a field produces clover, no one is at a loss, how to produce advantageous crops afterwards. It is in every ones power, to estimate what the ploughing and seeding per acre of oat pasture will cost, and according to circumstances, so will the expences be, but in general where the expences are high, the value of the pasture is equally so, and if even granted that the cost of ploughing, and seeding, shall be double in value to the pasture produced, let the comparative value of the field be fairly estimated, before the course was begun, a waste, or worn out field, and what it is now, when the course is completed and laid down in clover, timothy or orchard grass.

It will be of the first importance to have at least two fields, otherwise if the cattle are constantly upon the same field it will not be found so productive, and in wet weather, they should be turned into some field where the herbage was too hard in dry weather. It will

be eaten greedily by the cattle after they have been satiated with the soft blades of the oats; under this management, beeves have been fatted for family use and taken off in December, without any grain. It is observed that the oats scour at first, but the free use of salt, readily corrects the complaint, and in no pasture do they rise faster in flesh; and the juices of their meat uncommonly grateful.

The fields which have been in corn the preceding year, have also been sown in the spring; without being reploughed, and have done equally well, except upon heavy clays, when the spring has commenced with heavy rains, which have rendered the soil too compact to be opened, even with a heavy brake harrow, drawn by four horses. The fields from the oat pasture the foregoing autumn, have also been sown, without reploughing, when the spring has set in without much rain, after severe frost: not only the oat pasture, but also the clover sown therewith, have answered well.

Oats have also been sown amongst the hills, and drills of corn, after it has received the last dressing. It has succeeded, without any visible injury to the corn, provided, care has been taken not to injure the roots, by the plough or harrow at the time the oats were sown.

It has been enquired, are not all crops of oats exhausting, if so, how can two sowings of oats in the same year, render the soil fertile? it is granted, if oats shall be matured into seed they will certainly exhaust, but if cut off, while in the blade, they, and all culmiferous plants, will fertilize. The experiment was made with Indian corn, sown broad-cast, cut twice and car-

ried to the stable, and a crop of turnips taken off the ground the same season: the manure was laid on before the corn was sown, but none was given when the turnip seed was put in.

Another way in which oats fertilize, appears to be from increase of vegetable soil; this is within the view of every observer; the remains of the pasture ploughed in, particularly in July and August is speedily decomposed, its tenderness and moisture aiding the dissolution. But dry stubble and husky roots are difficultly decomposed, nor do they produce so much carbonic or coally matter in the soil, which chemists say decomposes the water, and produce the air required to promote vegetation. As the vegetable is produced from air and water, and not from earth, which seems to be no more than the laboratory where the process of vegetation commences, and finally serves as a matrix to hold one part of the plant, while the other parts are raised aloft, in quest of superior aid, to complete the inscrutable operations of the vegetable fabric.

It has also been enquired, will this process of oat pasture fertilize every where? it is answered, that where the soil and climate are the same, the effects will be the same also. A description has been given of the soils, where the experiments were made, and are still going on. If experiments of the same nature shall be made upon a different soil, and climate, the result will be different, and more or less favourable, according to circumstances, and for which the practice now mentioned, cannot in justice be rendered accountable. If my shoe fit my foot, I am warranted to say, it will suit a foot of the same size, and shape every where; let no

one conclude, that it will fit a foot of larger or less size or different form, but I must confess that passing over things equally obvious, I have run into numerous and expensive errors.

But when it is enquired upon what evidence it is to be received—the reply is at hand,living evidences, are at the command of every one who chooses to make the trial, let him however, be on his guard, against suffering himself to take a crop in place of the spring pasture oats.

If it shall still be enquired, how does the oat pasture fertilize? It may be also observed that the constant verdure and green herbage prevent the rays of the sun from parching the soil and depriving of its moisture and air, both of which are highly necessary to vegetation. The double portion of juicy vegetable matter arising from the two crops of pasture in the same summer, being every where united with the common soil partly mechanically and partly chemically, renders the soil capable of retaining sufficient moisture and elastic air, to make it open and warm, and by which the soil does not only become thicker by going downward, but actually expands, or rises, so as to give a furrow, considerably deeper, than formerly, over immoveable rocks. Some years ago, a field in view of the farm-house, marked the broad rocks, during the course of every crop; they are now covered with so much soil, that they are seldom observed. The two ploughings also contribute to the increase of the air in the soil, without which no soil can be fruitful, there being no vegetation in vacuo. Tull's horse hoeing husbandry, was introduced under the idea, that the *pabulum* of

plants was pulverised earth; the fact daily before us is, that pulverized earth, retains the *moisture* and *air*, as the handmaids of vegetation, some experiments have lately been made, the results of which favor these remarks, viz. "that *soils* afforded quantities of *air* by distillation, somewhat corresponding to the ratios of their *values*."

Inclosed I have sent soils in the state they were found, before the courses mentioned were introduced.

No. 1. A sample of the unimproved soil about three inches deep.

No. 2. A sample of the same soil four inches deep, improved by the lime compost two years.

No. 3. A sample two inches deep from the field in its exhausted state.

No. 4. A sample three inches deep from the same field, which was once sown in pasture oats, and has been one year in grass sown after the oats, which did not take well, partly owing to the late season when it was sown; and partly owing to the seed having been injured, and the soil still cold.

No. 5. A sample two inches from an exhausted field.

No. 6. A sample four inches from the same field after pasture oats, which was followed by wheat, a poor crop, and succeeded by oats a middling crop, with clover which yielded a considerable swarth last season;

when the clover is ploughed in, it will be followed by pasture oats.*

* The samples of soils sent by Mr. Young, exhibited the most marked difference. The progress from absolute sterrility, to rich mould, might be traced by the appearance of colour in the several parcels. I with great pleasure bear testimony on the subject of Mr. Young's improvements. In the years 1806 and 1808, I saw cattle feeding in good pasture and good crops of grain, and grass growing in fields, which in 1804, I thought totally irreclaimable from briars, garlick roots, and original poverty of soil. Where manure is at hand, and capital in the possession of the cultivator to purchase it, any soil may be rendered fertile; but Mr. Young affords the best example of good farming, viz. enriching a naturally poor soil, and restoring fertility to exhausted land, by returning thereto its own produce raised with the least possible expence.

J. M.

On Soiling Cattle: mixed cultivation of Corn and Potatoes. By John Lorain.

Read July 10th, 1810.

Tackoney, 21st May 1810.

Sir,

I received yours of the 14th instant, and consider myself highly honoured by your board, but am obliged to decline an attendance on your meetings, as my family who are very lonely situated, would not feel easy were I absent at night.

I regret exceedingly that my peculiar situation, prevents an intercourse with gentlemen who have added reading, reflection, and experiment to long practical information. Books and the practice of common farmers have heretofore been my only resource, the latter are too generally in hostility, with every thing that increases labour or expence, and it is extremely difficult to glean what will best suit the soil and climate of my farm, from the former.

I shall go on to make the most attentive use of such information as I can obtain, and should any thing worthy of record occur in my practice, it shall be communicated to you.

I am now trying to fat 27 young healthy steers, rising up from about five to eight or nine hundred pounds, also seven three year old runts and a cow, by soiling them in yards where they have shelter from sun and rain, and good spring water at will: fresh grass is also given them twice a day under my own inspection. For two

years past I have not succeeded owing as I suppose to deficiency of speargrass, they improved as fast as expected until the second cut of clover, which caused a frothing from the mouth and they would scarcely eat sufficient to keep them alive. The economy of feeding in this way, has not been exaggerated by reputable European writers, in this I think I cannot be mistaken, as correct accounts are kept for every field, and transaction of my farm.

One man and a boy of twelve years old feeds the above, together with six horses and three milch cows, one bull and a large ox that has grain, and where the grass is good the work is not hard; the manure is worth more than their labour, and although Dr. Anderson's mode of making hay under cover, may be rather visionary on an extensive scale, here it may be beneficially practised, and not a fork-full lost by over feeding.

Last spring I planted ten acres of Indian corn, the rows eight feet three inches distant, hills or rather clusters at eighteen inches on the rows; and but three plants suffered to grow in each. Between the corn, two rows of potatoes unplanted two feet three inches a part; eight acres were dunged on the sod mostly clover, the other two spread with tolerable rich mould; produce 430 3-4 bushels corn, and 848 bushels of potatoes. This product though not contemptable was far below my expectation, and can be accounted; for, the plan was novel to my ploughman, and I could be but little with him, a great deal of the corn was removed after up, to make room for the plough, much left standing with too little room, to the great injury of both crops, and either from the backwardness of the season or some other cause a considerable quantity re-

planted, and the last ploughing of three acres being too deep, while the ground was wet, it baked and turned yellow in a few days, this produced short corn and nubbins generally, except the ridges hereafter explained, they stood the test of this ordeal and although one of them planted too close to the potatoes, had but little soil left on one side, yet it flourished and produced plentifully: many rows were planted in the water furrows, made when the potatoes were put in, and yielded nubbins only, the replanted and removed gave fodder. I do not regret the loss sustained, by the clearing out furrows, as it led to valuable information, they naturally introduced ridges, in other parts of the fields, and here a double quantity of soil and dung was concentered under the corn, and it was luxuriant; one of those rows was cut and carefully set up by itself in my lawn, husked and measured in December, and yielded at the rate of 66 bushels per acre, and of one ton six hundred and thirteen weight of fodder, viz. blades, husks and tops, and one ton and seven hundred weight of stalks, excellent litter for the yard.—This was a beautiful shaded summer fallow; eight acres are now in wheat, seeded with sixteen bushels, and at least equal to any I have seen this season; the other two ploughed in the fall in one-bout ridges, and seeded in spring with six bushels barley, is really handsome except about one quarter of an acre of cold relentive clay, which has suffered by the drought.

I have planted this spring 13 acres in corn and potatoes, the former on five and a half feet ridges, two rows on each ridge, 12 inches a part along the rows and the same distance triangular across, two plants to be left

in each cluster. Between the corn ridges are planted on beds five and a half feet wide, two double rows of potatoes, vacancy between them two feet two inches, the double rows eight inches a part, straight and triangular like the corn; this leaves ten feet four inches between the double rows of corn for sun and air. I have never known a very large crop of corn without a great many plants, and if those can be better arranged with valuable crops of other kinds growing on the same ground, it will be an object, and it is strikingly obvious that the outside plants of a field are much the best, when not incommoded by fencing &c. Those grounds were ploughed in one-bout ridges in the fall, twice ploughed and well harrowed in the spring, manured at the rate of 64 loads* of farm yard dung per acre, each load 32

* I have frequently planted *Indian corn* in single rows eight feet asunder, and dropped single corns, two feet distant from each other in the rows; so as to stand in single plants. This mode was suggested to me by General *Washington*, who told me he had great success in it. When the corn was ridged, *potatoes* were planted in the cleaning out furrows; which were filled with rotted dung; and closed by two furrows backed over the potatoes by the plough. I have had repeatedly 40 to 50 bushels of shelled corn, and 100 to 150 bushels of potatoes, to the acre. The roots of the corn ran into the dung, and received every benefit. I never had a nubbin; as the stalks in general had each no less than three, and the most four, perfect and large ears. In *weight* the crop always exceeded the best corn cultivated in the common way; whatever number of bushels there might be. The culture must be clean, and the stirrings frequent.

cubical feet measured in the field, after being settled by the driving one half applied to the corn, the other half to potatoes; to avoid poaching the potatoe rows, the dung assigned them was hauled and dropped on the corn rows, and from thence spread on the potatoes, which were regularly placed in holes sunk by an indenting roller, one and three quarter inches below the surface, and covered by the plough securing a depth of loose soil underneath as well as the light covering of dung and soil above; after this the corn rows were well pulverized with a hoe harrow, when the dung was hauled and spread, they were ridged up and the sides of the ridges harrowed, and the tops flattened with a harrow without tines the holes made with an indenting roller two and a half inches deep, in which the corn was planted and covered with hand hoes; the potatoes are generally up with a rich broad leaf and strong stem, most of them harrowed with a folding harrow, an excellent tool, cleaning and pulverising the soil quite up to the stems of the plants; the

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I wait the result of such bold and heavy dunging on *wheat*. It is far beyond any thing I have known. I never could get wheat to stand till it came to the sickle, or with heads filled, or clear from smut or other diseases, after half the quantity of dung mentioned by Mr. *Lorain* was applied. But as my manure (dung) is always moderately fermented and putrefied, I cannot calculate what is the proportion of strength, or quantity, compared to Mr. *Lorain's muck;* as I suppose it to be.

If ever fresh dung, applied in any thing like such quantities, succeeds, with a *wheat crop;* it must be after summer crops have subdued its bad qualities, and effects.

R. P.

plough will immediately follow to earth them up,—the corn is just peeping out of the ground it being designed that the potatoes should take the lead.

And am with respect, yours &c.

JOHN LORAIN.

DR. JAMES MEASE.

Read July 10th, 1810.

Sir,

The following contains a confirmation of the opinion I have always held, as to the operative principle of the plaister of Paris. It will be seen in my "*agricultural inquiries on plaister of Paris*," published in 1797, that I therein mentioned, as a conjecture, what reiterated experiment has since proved. I translate from the *French*, a sketch of the *memoire* on the subject, sent to me by a friend. It contains information worthy of being promulgated; though much of it is *here*, more confirmatory than new, as to the plaister. But I do not recollect that any experiments have been made with SULPHUR, for the purposes stated in the memoire.

RICHARD PETERS.

20*th June*, 1810.

DR. JAMES MEASE.

Secretary of the Agric. Soc. Philad.

THE EFFICACY OF SULPHUR ON VEGETATION.

"*A* MEMOIRE *of* M. BERARD *the elder a trader at* PONT-LIEU LES LE MANS, *and member of the society of that town, treating on the use of* PLAISTER *or* GYPSUM, *employed as a manure; containing observations curious and useful in agriculture.*"

"*M. Berard* observed, with admiration, in many journies on the borders of the lake of *Geneva*, in *Savoy*,

and elsewhere, the excellent crops of *clover* plaistered; and was astonished at the prodigious effects of that manure; considering the small quantity used. But although the mode in which that substance acts upon vegetation, has remained, and will always be a mystery; the thoughts which *M. Berard* has expressed on the composition of the *gyps*, and his appropriate conclusions, have not been useless to himself, or destitute of benefit to the art of husbandry.

"*M. Berard* having seen in chemical books, that the analysis of the *gypsum* produced much of the *sulphuric acid*, combined with lime and other calcareous earths; and, calculating its quantity, he saw that this manure *owed its wonderful efficacy to the* SULPHURIC ACID; in a proper state of combination to promote vegetation. This acid entering into the composition of animal and vegetable matter employed as manure, was to him a confirmation of the opinion he had adopted, of the power of this agent in the work of vegetation.

"The fertility of the lands abounding in volcanic matter, as in the neighbourhood of *Catanea* in *Sicily*, near *Naples* &c. where the soil is evidently combined with the ashes of the volcano, or of decomposed lava, afforded a strong proof of the vegetative virtue of SULPHUR.

"After these reflections, *M. Berard* caused *brimstone* to be pounded and sifted; and mixed it with *ashes*, to render the sowing easy. Having spread this powder on *clover* and *lucerne*, on *wheat*, and *natural grass*, he waited the effect. It was surprising on the *lucerne* and *clover*; but *little perceptible on the wheat and natural*

*grass.** Repeated experiments gave the same results. It was particularly remarkable, that its effect was the most prompt, when, after its application, a shower of rain fell: without doubt, because moisture aids and developes the sulphuric principles. Let the powder or the gyps be employed, the result is always the same.

"It appears, that we may conclude from this, that *sulphur*, is one of the greatest stimulants to vegetation. Let this be admitted, and we perceive the numerous advantages of this discovery, to the agriculture of countries wherein *sulphur* is common. We already have shewn the benefit of sulphur for artificial meadows. Many proofs have demonstrated, that it singularly promotes the vigor of the *olive tree*. Perhaps the same advantages may be derived to other *fruit trees*. It is known that countries abounding in sulphur produce the strongest wines. We may conclude from this,† that *by introducing the sulphur, in a convenient proportion, in the compost of dung, earth, and sand*, which commonly furnishes the manure for *vines;* and suffering the whole

* I have never derived any benefit from *plaister* on *wheat* and *natural* grass. Some have told me that they have profitably applied it to *wheat;* but I have never seen any instances of it; save that plaister on moistened or steeped seed wheat (if it be not steeped in brine) has been useful, in giving the plant a vigorous shoot, in its early stages.

R. P.

† This agrees with my frequent practice of introducing *plaister*, instead of *lime*, into dung and compost heaps. See volume first, page 283.

R. P.

to ferment, we shall ameliorate the nature of the vines; and produce the quality of those grapes, which are cultivated on grounds filled with volcanic matter. It is, at least, worth the experiment." [Extracted from the *Annals of Arts and Manufactures.* 1809.]

I have, on garden plants, long and freely used *flour of sulphur* (on melon vines particularly) to destroy or expel the grubs and flies. I have perceived them to thrive, but attributed their vigour to their being freed from annoyances. I have also used *sulphur water* on fruit trees; to banish or destroy aphides. I plaister most plants; and therefore have supposed, that the gypsum alone had benefitted them. A small infusion of *oil of vitriol* (SULPHURIC ACID) in a large proportion of water, promotes vegetation in, and banishes insects from, garden plants. It would be well to make some experiments with the sulphur alone; or combined as the memoire mentions, on a variety of plants: on those of the *trefoil tribe* especially. I do not see why the sulphur, in substance, should not produce effects similar to those of its derivative—*sulphuric acid.* But plaister is, with us, cheaper; and in greater plenty.

RICHARD PETERS.

In page 98, AGRICULTURAL ENQUIRIES ON PLAISTER OF PARIS, I mention—

"If Ingenhausz's ideas of the almost magical powers of the *oil of vitriol* (SULPHURIC ACID) on vegetation be just, in any

important degree, the *sulphuric acid* may be considered either in itself, or as it sets other active agents at work, the main spring of operation in plaister. It is commonly used by chemists to separate the *carbonic*, and all other acids, from their combinations, wherever they are found. The earth, according to the theories before stated, is constantly filled with the *carbonic acid*, by furnishing *carbon* to the air it inhales. It is found in calcareous substances, with which, in great varieties, the earth abounds; it exists in, or is produced by, the roots of decaying or decayed vegetables, trees, and all animal or vegetable manures. I therefore think it a corollary fairly to be drawn from this theory, and the *actual analysis of the gyps*, that it is this *sulphuric* or *vitriolic acid* which *constitutes its operative principle*, &c,"—And see volume first, page 158.

I have since ascertained by a variety of practical tests, to my satisfaction, that this opinion was well founded. After separating the *vitriolic acid*, the other parts of the plaister are inoperative; and have no effect whatever on vegetation. As to my conjectures about the mode of its operation, they yet remain mere conjectures; though practical effects are beyond all doubt. I believe also that, "the *mode* in which that substance acts upon vegetation, has remained, and will always be, *a mystery*." Why it acts on some plants, and not on others, is as mysterious and inexplicable, as is its mode of acting on those whereon it produces invariable and wonderful effects. We know what will assist its operation; and can supply artificially what it does not find, or has exhausted, in the earth. And this is enough for us to know; for all practical uses.

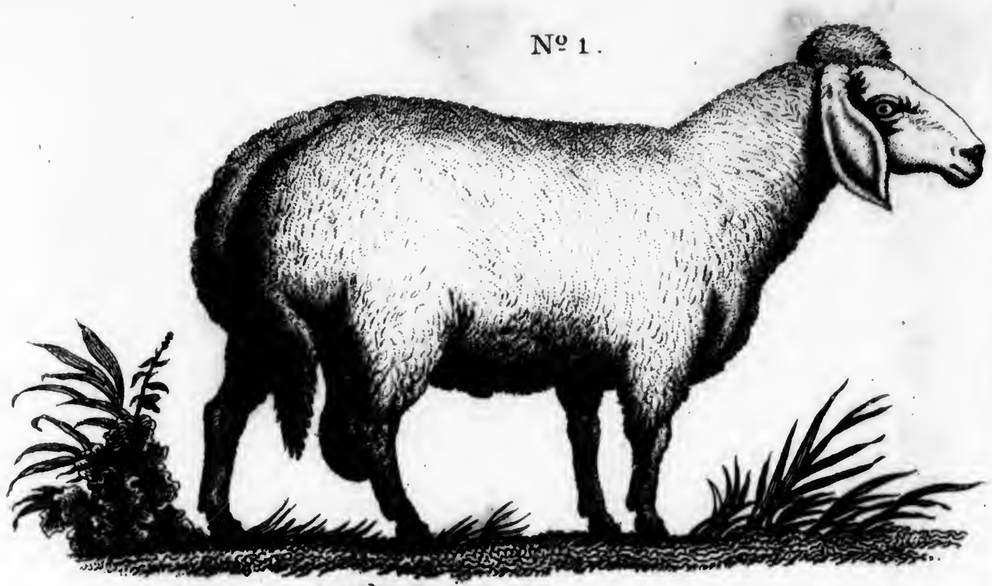
R. P.

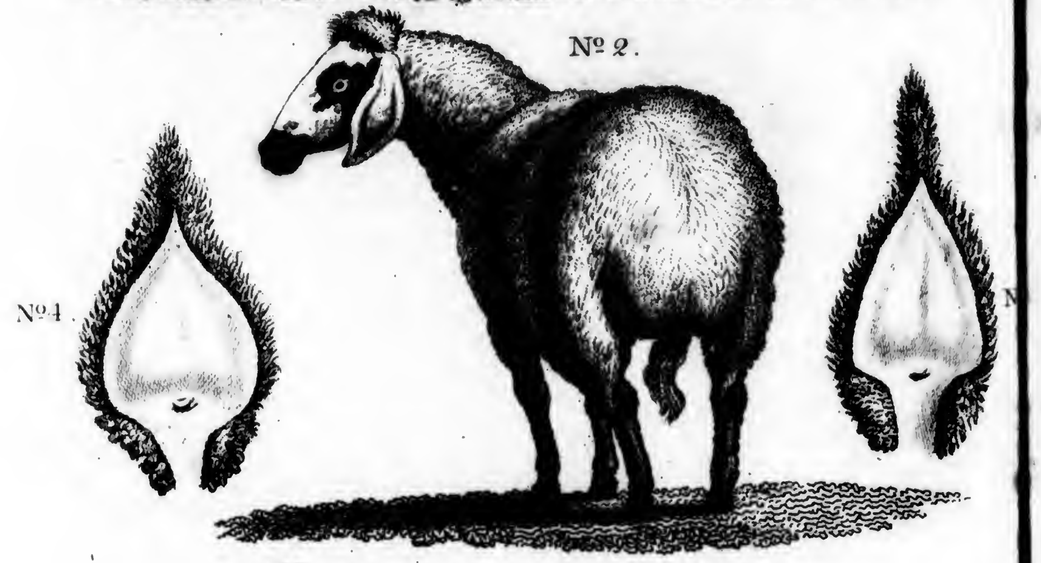
Drawn after nature. H. Barralet

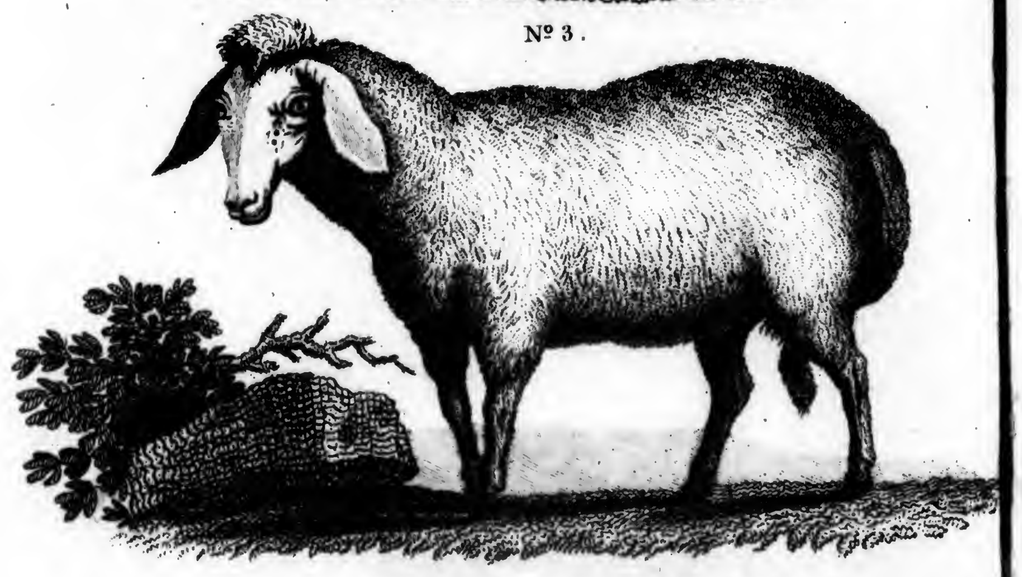
Tunis,-*Broad-tailed*,-*Mountain*,-Sheep. *By Richard Peters.*

Read May, 8th 1810.

It will be seen in the first volume of our Memoirs, that I obtained the original stock of these sheep from Colonel *Pickering*, then secretary of state; to whom they were sent by *William Eaton* Esq. when consul of the United States, at *Tunis*. For this estimable proof of his patriotism, he merits the thanks of all who profit by its advantages. I deemed myself bound, though no terms were made with me, to distribute many of their progeny gratuitously; and gave away lambs, for several years, with a view to encourage and spread the breed. My pastures were overburthened with ewes, sent to my rams when no charge was made. Those who received the benefit, were not sufficiently conscious of its value; save that they found the *broad-tail* excited curiosity; and procured a ready sale for the lambs. The original ram, after I had bred from him some excellent sheep, was sent, for his own, and the use of the farmers of *Lancaster* county, to my late friend General *Hand*. I was offered what was then deemed a high price for the ram, by some victuallers; who wished to breed lambs for the market; but I did not think it consistent with my ideas of propriety to accept it. Nor did I wish the lambs killed; and my object of increasing the numbers, and spreading the breed, defeated. I gave up the management of my farm to a tenant, on shares; and with it the full blooded sheep. Neither he, nor those







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INTENTIONAL SECOND EXPOSURE

succeeding him, held the sheep in proper estimation; though every endeavour was made to impress it upon them. The lambs were sold, year after year, to the butchers; at the prices, or nearly so, given for those bred from common sheep. It is only very lately that the present tenant has discovered their value, by the demand for them; which is now much greater than can be supplied. This demand is created by the experience of those who have been convinced, by their own observation, of their superior excellence. My flock is so reduced, that, in a pecuniary point of view, this late conviction of the value of this breed, is to me of very little importance. My tenant is now taking some pains to recover his lost time and opportunity. I am happy to know, that others have been more careful to preserve this highly valuable race. I mention these, and other, circumstances, to account for these sheep not being very extensively known and estimated, for a length of time.

My endeavours at getting the sheep into credit, were, for a long time, very unpromising. I had insensibility as well as prejudice to combat; nor do I believe them yet entirely overcome. The trouble I now give to the society, by a long, though just, detail of the character and qualities of these valuable sheep, is my last effort to remove and conquer what remains of this insensibility and prejudice. Experience in the affairs of the world too often shews, that whatever intrinsic merit a saleable article may possess; *the price in the market* is the criterion by which its value is generally estimated. It is not unlikely that my object of spreading this breed of sheep, and inducing care and attention to them, would have

been (taking mankind as we find them) more effectually accomplished, by demanding large sums for even the few I could have sold, or hired out as tups, at high prices. If any *new* proofs of this view of the subject were wanting, the daily instances of purchases, at prices novel and astonishing in *this country*, made of another highly valuable race of sheep, would afford them.* The zeal now prevalent for the breeding this, or any other, estimable addition to our stock of domestic animals, did not exist at the time the Tunis sheep made their first appearance. I am highly gratified by present prospects

* A pair of *Merinos* have been recently sold at $ 3000. I never knew a pair of *Tunisians* sell for more than $ 100; and most commonly for half the sum. Whatever may, in practice, be proved by the *Hudibrastic* calculation,—

——" *What is* WORTH, *in any thing,*
" *But so much* MONEY, *as 'twill bring?*"

few farmers could sustain a loss to the amount of prices now demanded for full blooded *Merinos*. A *dog*, in a few minutes; and *disease*, in a few days, would ruin, or materially injure, a farmer of common circumstances. Whether these prices be high, or low, I pass no opinion. Yet bounds should be set, to desires for profit. And this must be left to regulate itself. The *Merinos* have had able and fortunate patrons; but their character abroad has mainly promoted their credit here; while the *Tunisians*, with no assistance from foreign reputation, and even contending against prejudices, as well as insensibility to their value, have principally advanced themselves. When, however, the former were offered for sale, at first, near Philadelphia, *their* merits were so unknown, or overlooked, that their lambs were sold to the butchers, for lack of other purchasers; though the sheep were *then* offered at moderate prices.

on this subject. I am by no means desirous that it should be repressed in its application to the favourite race of sheep, now endeavoured, almost exclusively, to be brought into fashion. I am fully impressed with the value of *Merino wool.* No other wool, within my knowledge, can, compete with it. Nor do I mean in any way to lessen the estimation in which the Spanish sheep of this breed, are held. I say of *this breed* (in which there are varieties, some whereof are much inferior to others) because in *Spain*, there are sheep of as coarse carcase and wool, as any of the worst we have. And it is well known, that the mutton of all breeds there, is so indifferent, that the tables of the wealthy are supplied from *Barbary: wool* of valuable breeds, being the primary object, is no doubt the cause of inattention to the other uses of sheep; added to other circumstances.

Our country is extensive enough for many different races; and some, in parts of this, as in all other countries, may thrive where others will not. In *South Carolina* the Tunis sheep, obtained from my stock, are preferred to all others. In *England*, and other sheep-countries, that some breeds are better adapted to local circumstances than others, is verified indisputably; as will be seen in the accounts of their best writers; though sheep may be indigenated, with proper care, in any country. In *England* I have never heard of the *Tunis mountain sheep*. Their writers do not mention it; though they have broad-tailed sheep; and I am persuaded this species is there unknown. I therefore wish that the TUNIS-BROAD-TAILED-MOUNTAIN-SHEEP, may have its share of attention; without interfering with the views of those who prefer others. I have mentioned emphatically their

specific distinction, because the broad-tailed African sheep in general, so far as my knowledge extends, are much inferior to these. All I have known (except some *Persian* sheep) with broad tails, have been an unprofitable race; though no doubt, as they occupy so great a portion of the habitable globe, there must be, among them, many valuable kinds.

My experience and observations as to the *Tunis* sheep, are founded on a knowledge of them for a period of thirteen years. The benefits arising from their propagation have accrued, in the greatest degree, to others. For it may be seen, that my advantages—except in the real pleasure, and solid satisfaction I derive to myself from even the partial success of my efforts—have been small indeed. I see no cause to claim any merit over others, on this account. *Reasonable* emolument is the just reward, of all who risk or labour in laudable pursuits. I do not aim at establishing this on the depretiation of other good breeds; being only desirous that it should take its proper rank among them.

There should be varieties of races and kinds; to suit not only local circumstances, but also different objects, for which they are intended. I believe with *Culley* (on live stock: page 153,) "*that* breed is the best that brings the most profit, *in fleece and carcase together*, from the same ground, in equal times." I do not hesitate to avow my persuasion, that the *Tunis mountain sheep* will, in the long run, compete with any, in this view of the subject. The temporary price of better wool, with all that has been said of its presumed stability, does not alter my opinion. Plenty or scarcity of an article, and shifting demand for it, operate on price.

These are circumstances perpetually fluctuating. That breed is most generally desirable which is best suited to all common circumstances; and requires no more care and attention, than good common farmers can, and will, bestow.

I have never seen better *home-made* cloth, than the selected parts of the Tunis fleeces, and especially the cut next the pelt, will afford. Some of them will bear three cuts, of about an inch and an half to two inches long, each. Many of the fleeces, are of this description; and more are short and fine. Of worsted and fleecy hosiery, I have not seen any other wool produce superior fabrics, for common use. For the latter, the cut next the pelt has been used. I have seen some fleeces apparently *furry* next the pelt, like beaver; but consisting of very fine-fibred wool.

The *mutton*, is known to be among the finest and best in our market. The proportion of flesh to size of the animal, is, I think, remarkably great. There is little *offal* in this sheep. It is, when pure, hornless; and its bones are small. It lays the fat on profitable points. Though it does not shew the suet on the kidneys, as much as do some other sheep, yet the fat is mixed with the flesh; which is of the most inviting colour; and marbled in a striking degree. Its tail (which I have known, when prepared for cooking, to weigh from six to eight pounds) if *properly dressed*, is a feast for an epicure. The tail of a young beaver, which I have enjoyed when I dared to indulge in such food, (when free from a fishy or sedgy taint, to which, at certain seasons, the flesh of amphibious animals is subject,) is the only rival I know.

The following additional account of these sheep, can be verified, by myself, and others who have gained a practical knowledge of them.

1. The *Tunis sheep* are better set with *wool*, than any others generally known here. The *Merino* may be an exception; but it remains for experiment, in a common course of keeping sheep, by farmers here. There is no part of its body uncovered. It does not shed its wool like common sheep: so that I have never seen a ragged Tunis sheep, where the blood of the stock predominated. If the wool of the mixed breed is deciduous; it shews that the sheep partakes of the cross, more than the stock. I have known one kept unshorn for a year after the fleece might have been taken off; and the fleece continued entire and thriving; and the sheep remained in high health. But I would not recommend this, as an eligible practice. For very fine fabrics, the *Merino wool can* be used alone; and such are only within the purchase of the wealthy. It is most generally mixed with fine wool of other fleeces; and it is in such case, worked to most profit. The *Tunis wool* is sufficient for all common purposes; and can be applied without mixture with other wool, to more uses than that of the Merino, or any other sheep generally known here. The average weight of fleeces is from five to five and a half, and I have known some flocks to average six pounds; I speak of a selected flock, well fed, and attended to with care. From individual sheep of the full blood, I have shorn eight, nine, and ten pounds. I mean, in this estimate, washed wool; or from sheep washed before shearing. I have generally (but not always) practised this; and I have never found any dis-

advantage, either as to cleanness of wool or health of the sheep. In the crosses, pains should be taken to select breeders of the best forms and fleeces. From carelessness in this respect, many persons have injured the character of this sheep, and its fleece. It is as vain to expect good fleeces from a starved, neglected, or ill assorted, flock; as it is to count on a good crop, from a poor, and ill managed field. I am convinced that the wool of this sheep has never been properly known or appreciated; the mutton having been the object. I have now as fine, and as white, home-made blankets, and have seen as fine flannel, made from the white wool of spotted fleeces, as those made of any other wool usually devoted to such purposes; there being always as much white wool, as will answer for every fabric requiring it. In the dressing of blankets and flannels, we are yet much behind the Europeans.

2. They are hardy; and will bear either cold or heat, better than any others within my knowledge. I have, on a small scale, (never less in number than one or two score; and frequently from 80 to 100) had an interest in, and kept, sheep, of every breed known in this country, for a period of 45 years—some breeds recently introduced, and the *Merino*, excepted. I never knew a hardier sheep, than are those of the Tunis breed. Were I to point out (in my estimation) the proper form, size, and valuable points and qualities of a sheep, I could not more jusdy designate them, than by exactly describing my old ram *caramelli*.

3. They fatten with less food, and much quicker, than any other sheep. That other sheep become as fat, I know: but more time and food are required, so to

make them. They will bear to be kept fat, without being diseased, far beyond any others within my knowledge. The carcase is heavy, but not coarse; as are many other sheep of large sizes. The heaviest ewe of this breed I have known weighed 182 pounds alive, when sheared. Her fleece, clean washed, weighed eight and one half pounds, she was half blood. A half bred ram, a twin, at 18 months old, weighed 214 pounds.*

4. Their character is that of gentleness and quietude. And they live in health, vigour, and usefulness, to greater ages than other sheep. I never saw a breachy Tunis sheep. Some exceptions there may be, but they

* Although I have mentioned the sizes and weight of sheep, and facts as they respect the mutton, I do not value the large sheep the most. I have always found that moderately sized sheep, of any breed well fleeced, are the most profitable. One of the finest, and proportionately heaviest fleeced and superior fleshed wethers, of the full blooded Tunis breed, weighed 18 pounds the quarter. He was stunted in his growth, by an accident when a lamb. I do not admire very fat mutton, of any breed. The Tunis *ewes* are the smallest; and generally carry the finest fibred fleeces. I have long been convinced, that large *cattle* are the least profitable. Middle-sized *horses*, are to be preferred.

I think it a great mistake in crossing, to prefer sheep of large sizes; though, no doubt, some respect is to be paid to this circumstance. The qualities of fleece, flesh, temper, hardihood, healthfulness, and tendency to feed well and œconomically, are more important than size. The largest sheep have generally the coarsest wool, and most indifferent mutton. The full bred Tunis sheep are naturally of sizes the most eligible. The old ram was reasonably large; and much above the size of common sheep.

are rare. Yet they are not inactive; but use sufficient exercise for health, without wandering and fickleness as to pastures. In these they are not overnice; and will keep in good condition, upon coarser and less food, than any sheep I am acquainted with.

5. Their general healthfulness enables them to retain their fleeces. A diseased Tunis sheep is rare; even in a mixed flock, in which other sheep have been subject to every disease known in that animal. I have had them disordered in the feet, with the *fouls*, but not the *foot rot*. If the hoofs of sheep are examined, there will be found a small opening, near and above the fore part of the cleft. It is the mouth of a duct, running up the shank; and calculated for the emission of a mucilaginous oil, which lubricates, supports and assists in the growth and renewal of the corneous parts of the hoof. Perhaps it is also a drain for humours, which, when confined, become morbid and peccant. If this closes, the disease appears.* Examine well, and rub briskly the parts together. Assist the opening of the duct, and the discharge of the morbid and stagnated matter, in every way. Poke juice, I have found efficacious. Few are acquainted with this part of the animal structure, though, I believe, all cloven-footed animals are thus formed. Swine have the duct, in the hinder part of the leg. Cattle in the cleft; which when diseased, is lacerated often by a hair rope drawn between the clefts; when gentler means would effect the purpose.

* *Worms* are often found in this duct, and in the shanks of common sheep. None have ever been discovered in the shank, or in this duct, of the Tunis sheep. Probably because the wooliness of the part kept off the insect which generates these worms; if so they originate. The disease I call the *fouls* in the Tunis sheep, is occasioned by coagulated matter, and not worms, in this duct.

6. A Tunis tup couples with a ewe of other breeds with more certainty of effect, than a tup of the common species, with a Tunis ewe. The broad tail is the impediment. This must be managed by an adroit *pander*. I have known frequent failures in projected crosses, owing to inattention in this particular. But the Tunis tup finds no difficulty with a ewe of his own race. However whimsical it may appear, the *colour of the tongue* of any breed, is said to be important in the selection of a tup. The third georgick of *Virgil* records the fact; which I have seen verified in several instances. I give *Dryden's* translation of the passage.——

> "Even tho' a snowy ram thou shalt behold,
> Prefer him not in haste, for husband to thy fold,
> But search his mouth; and if a swarthy tongue
> Is underneath his humid palate hung,
> Reject him; *lest he darken all thy flock;*
> And substitute another from thy stock."

If this should seem to some improbable, it will be no difficult task for the incredulous, to avoid the black tongue;—lest, *per chance*, the denunciation of *Virgil* may turn out well founded.

7. The *tail* is the true test of purity of blood; and horns are a bad symptom; especially if large. The tufts on the thighs, and crest, or forelock, are also marks of blood.

Those who find this race preferable, under all its circumstances, must balance advantages and comparative defects. It is, like the *Merino*, a peculiar genus and race of sheep. Those who value them must reconcile themselves to coloured wool; though the greatest pro-

portion is white. But I have not found, that *whiteness* is the criterion of quality or fineness; and I have often found the *tawney*, the finest wool. Every part, of every colour, but black, will take dyes, equal to any wool of any species. *Whiteness* is therefore of little substantial importance, or benefit. If the Merino wool had no other excellencies, real or fanciful, its whiteness or cleanliness would not recommend it; as it is not, so far as I have seen, remarkable for either. We must take things as God made them; if we would have them according to their kind. Art as often fails, as succeeds, in attempts to ameliorate. The *lambs* of the Tunis breed are *white*, *red*, *tawney*, *bluish*, and *black;*—but the fewest of the latter. All (except the black) grow white in the general colour of the fleece, though most commonly coloured in spots; and either tawney or black generally marks the cheeks and shanks; and sometimes the whole head and face. A perfectly *white Tunisian*, is as much deteriorated by this singularity of departure from stock, as is an *Albino negro*, who is an Anomaly in the African race of men. I have seen some nearly white sheep, of this breed, and tolerably high blooded, after three or four crosses with this object; but I never liked them the better for this circumstance; which I always considered a departure from blood and race. The whiteness of fleece was obtained from the sires, or dams, of the crosses. The sire commonly gives the character to the progeny. I would not, however, be understood to say, that mixtures, or crosses, with well selected sheep of other kinds, are prejudicial. On the contrary, I have had, and have seen with others, fine sheep of half, three quarters and seven eighths blood. But

not all of these crosses (especially where white fleece is the object) shew the tail in perfection; and I think many are deficient in some of the best qualities of the sheep; and *that* in proportion to defect of tail, and whiteness of fleece.

A neighbour, who has, I believe, been accustomed to, or acquainted with, the modes of managing sheep in *Ireland*, and has great merit in preserving the Tunis breed (obtained from my stock) in high perfection; avers, that, by attentive selections, and proper management, he can have Tunis sheep, as white as any others. He succeeds better than I have done;—and *believes* what he wishes.—But I perceive, in spots, a cast of tawney tinge, or a departure from blood, in those he deems perfectly white. A strong propensity to believe, wonderfully assists our faith.—A most worthy countryman of his, has often, with fervor and solemnity, assured me;—and *he* believed it—that the *eggs* of Ireland were the *whitest* in the world! He despised them as an esculent, if the shell had not, what he called, the *Irish mark;*—that is,—*in English*,—pure white,—without any mark at all.—He held nothing in greater abomination than a dyed,—or what he called a pie-bald, easter egg. It was in vain that one attempted to persuade him that the interior of all eggs was alike; so far as depended on tints or colour of shell.—*De gustibus non est disputandum.*—So I have no controversy with those who do not fancy the wool,—or, if they so please, the mutton, of a coloured sheep.

RICHARD PETERS.

Belmont, May 3d, 1810.

To the Philad. Soc. for promoting Agriculture.

POSTSCRIPT.

When I made the foregoing communication, I had not read Chancellor *Livingston's* account of *broad-tailed sheep;* in his essay pages 27 & seq. He has my sincere thanks, and is entitled to the acknowledgments of all farmers, for much valuable information promulged in this essay; however widely I may differ in opinion on some points. My accidentally meeting with the essay, has compelled me to pursue further, a subject I had conceived closed.

By my perusal of it I am satisfied, that he is entirely unacquainted with the sheep I have mentioned. If he had not so been, I know his candour too well to suppose, he would have omitted to make them an exception to the worthless and spurious race he has described. To the character and qualities of my sheep, his description is a perfect contrast. It would furnish, in the hands of a pupil of *Hogarth*, not even a tolerable caricature. Those Mr. Livingston pourtrays are not, as he asserts, an original race; but one produced by nature in a sportive freak; assisted, as he alledges, by "the art of man;" who took an undue advantage of her aberration, which afforded "a basis whereon to engraft his whims."

The *Tunis mountain sheep* are as much, in my belief, the *bona fide* and unsophisticated descendants of an original stock, as are the portions of the human race inhabiting the regions wherein they are found. They are therefore not comprehended in the account he gives of the hybridous intruders into animal existence. If they were even a sportive production, it would have been a most fortunate gambol; for it would have added

a most valuable item to the catalogue of domestic animals. I claim the exclusion of the Tunis sheep from his zoography.

1. Because in Mr. Livingston's *Lusus Naturæ*, all the fat of the hinder parts is in the tail.—In the Tunis sheep, it is well, and generally, distributed through the whole carcase.

2. In his *Hybrids*, the caudical fat (for in my recollection he mentions no other, in any quantity) is, in warm climates, oily and soft, and, when melted, will not again indurate. In the natural Tunis sheep, all the fat is capable of resuming its hardness after melting. I have never seen more solid, whiter, or finer mutton tallow, in all states of atmospheric temperature, than the fat of this sheep affords.

The speculations of a mind so ingenious and instructive, excited by a laudable desire to inform (though there may be some fanciful flights) I leave on their own merits. I believe professed naturalists know little more than I do, of these, or other secrets of nature. The celebrated *Buffon* is not without a *quantum sufficit*, of what the French call "*les Egarements de l'Esprit*,"—visionary wanderings.

The *protuberated tail* of the Tunis sheep, composed of "delicate esculent," and not of soft fat, as a mere "repository," and which Mr. Livingston calls "an excressence and deformity," was, no doubt, bestowed for wise purposes. By what I have mentioned of the difficulty attending the coupling of a common tup with a Tunis ewe, *it would seem*, that this guard was given to her, and other broad tailed sheep, to prevent mixture with a different species of animal; which the author of

nature uniformly interdicts. To the ram, it is furnished, that it may descend to the progeny. *Perhaps* also to prevent the introduction of worms, or progeny of insects, which may, in a peculiar degree and manner, infest sheep in warm climates; in which the sheep of every variety, are generally broad-tailed.

The intestines, and all other parts, of these sheep are remarkably clear of the kind, or any other species, of worm; or the knobs, found in the entrails, and other parts, of sheep of other breeds. See Mr. *Capner's* account of these worms. Vol. 1. pages, 133, 4.

I have seen ingenious and speculative opinions, concerning, what may as well be called an "excrescence and deformity,"—the protuberance on the back of the *camel;*—another *African* animal. This *bunch* is greater or less, accordingly as the animal is generally fat or lean. The broad-tail of the sheep encreases or diminishes in size, in proportion to the general state of the fat in the carcase. But neither the bunch, nor the broad-tail, is the "repository of all the fat." I never knew it alledged that the bunch was produced by nature in a sportive fit; or owed its origin to "the art of man." For its being placed where it is, I do not pretend to account. Human reason only exposes its own deficiencies, when it attempts to account for unaccountable things. This appears in more important subjects, than those of the broad-tails of sheep, or the bunches of camels.

I should not have deemed it necessary to annex the following certificates, which might have been multi-

plied; but since erroneous opinions have been formed, and *published*, I wish the facts I have stated may be ascertained by the testimony of practical men. Mr. Livingston, whose zeal, talents and instructive intelligence in general, I highly respect, has unwittingly, degraded the whole *dynasty of the broad-tails*, stock and branch, from their rank in the scale of created beings; though they have, from the beginning of time, had undisputed possession of two quarters of the globe, and a part of the third; to wit, of *Asia*, *Africa*, and part of *Europe*. I have endeavoured to introduce some of them, to the acquaintance of those who inhabit the fourth quarter of the world. Mr. Livingston would have excepted, had he been acquainted with it, this branch of the family; and would have been among the first to welcome it to this place of refuge; from the disgraceful society of its *illegitimate* and unnatural African collateral relations: for such those must be, to whom his description applies.*

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* *Hæ Nugæ in Seria ducunt:* however trifling these things may be in themselves, they lead to serious consequences; they revive, or create and foster, unwarrantable prejudices. When I sent the ram to *Lancaster* county, the Germans, there, would not, at first permit any connection with their ewes. General *Hand* was obliged to buy thirty or forty ewes, to set an example. The Germans considered it an unnatural intercourse—"*verknüpffung unnatürliche*;"—and they stiled *Sultan*, or *Caramelli*, an outlandish-mongrel-brute;—"*ausländisches unvernünfftiges Maul-thier.*" But when the Philadelphia butchers sought for the lambs, and good prices were given for them and the wool, they altered their opinions; and the stranger

Even the broad-tail, which Mr. Livingston considers "an excrescence and deformity," I have not viewed in any disgusting aspect. The representations in the plate, are faithful portraits; taken from sheep now in my possession. From these my opinion—or if it be so construed—*fancy*—may be judged.

Although not overmuch of a *stoick*, I should, were it not that old prejudices may be again revived, and operate unfavourably, have imitated, on behalf of my sheep, had they been even specially mentioned, the complacency and silence, recommended by one of that sect, I think, *Epictetus*. This disciple of *Zeno* advises those of us bipeds, who may be misrepresented and disparaged, to be content in our consciousness of its being unmerited: because we are to presume (*a la mode de la secte des stoïciens*) that some imaginary characters, and not ourselves, are aimed at. This philosophic apathy would, no doubt, be really *Greek* to men of ticklish tempers; though en-

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became a great favorite. Their interests only, can conquer their prejudices. When I first endeavoured (36 or 37 years ago) to introduce among them the *plaister of Paris*, their incredulity and prejudices were strong. Some *calender-macher* told them, it attracted thunder and lightning! and made rich fathers, by its first operations; but poor children, by its final exhaustion of the soil.—Their children, now, know better. I lament their prejudices; but highly esteem *them*, for many good qualities.

That a cultivated mind, and those ignorant of all culture, save that of the ground, should unite in the same erroneous opinion as to the sheep, proves nothing, but the meeting of two extremes.

R. P.

forced in language more generally understood, than that of this impenetrably patient old *Phrygian*.

Their long and peculiarly *laping ears* are, to me, the only ungraceful parts of these sheep. Most sheep have, more or less, the *lap-ear;* but I think none others so remarkably. I have seen an old conjecture, which I believe Mr. Livingston has adopted, ascribing it to confidence in their security under the protection of man; who guards them, when domesticated, from their enemies; and supersedes the necessity of listening—*erectis auribus*—to impending dangers. Whether there be, or not, any thing in the structure of the ear, shewing that it was originally formed to be erect; I, who am not a professed naturalist, but one of the *lai-gens*, will not presume to determine. I am satisfied with knowing, that these sheep have *lap-ears* and *broad-tails:* and, believing that the Almighty had so formed them, in the original creation of the stock, I am content. That their pendulous ears are owing to an acquired habit of security and confidence; or of settled compliment and submission; produced by a similar temper (to compare small things with great) with that which induces the dousing of pendants, or dropping of peeks, to friends or superiors at sea,—as if reason and instinct evidenced like propensities,—I am not prepared *peremptorily* to decide: though some naturalists seem to have no difficulties on such subjects. I am less puzzled when I believe, that their creator, for wise purposes, so fashioned them.

No animal is more timid than the sheep; and none have more frequent occasions to be so. *Dogs* are their eternal foes; and dogs (lap-eared dogs among the worst)

are the companions of their protector,—man; and are always near them. Dogs, 'tis true, are often tutored to guard them; as *Arabian robbers* are engaged to protect *Caravans*, from other *banditti*. But among dogs, their foes far out number their friends. *Wolves* are forever prowling after them, in all countries. Yet every where they lap their ears; though every where, there are unceasing occasions for erecting them; were the capacity of so doing in their nature. It does not appear that their causes of apprehension, cease with domestication.

I have dilated on this subject, not merely for the sake of discussion; but to prevent (as far as in my small powers lies) the *lap-ear* sharing the fate of the *broad-tail:* and (as a guardian to my dumb wards,) to rescue the animal from the imputation of not being one of God's creatures, "*brought forth after its kind*,"—but a factitious product "whimsically" formed by the intervention of "the art of man."—And yet, I feel a little ashamed of taking any pains to prove, what seems self-evident.*

RICHARD PETERS.

May 22*d*, 1810.

* It is as difficult as vain, to oppose serious refutation to fanciful conjecture. I have therefore, as much as possible, avoided it. Those the best qualified in grave and logical discussions would only excite a smile, by applying them in opposition to Lord *Monboddo's* phantasm of the *human tail.* No one would gravely combat an hypothetical assertion, that, because a negro appears a variety of the human species, he is an hybridous *African* animal. Indeed, those of this race have been treated as if it really were so: save that the "art

of man" has been, most flagitiously, employed, not in their formation, but in their destruction. In the quarter of the globe inhabited by this variety of men, varieties of animals are so numerous, that some not seen before are said, by a traveller, frequently to present themselves. Some men, and some sheep, have *wool;* while others, both men and sheep, have *hair*. *There* the colour of the human skin has every tint, from white to black. The *ears* of some quadrupeds are almost perpendicularly erect; while others are inveterately pendant; being from one to two feet long. Such is the *Mambrina*, or Syrian goat. While the *Ourang Outang*, the head of the family of *Simiæ*, is entirely without a tail; the *Papiones* have short stumps. One more inclined than I am to indulge conjecture, might, with no small degree of plausibility, suppose, that this precedent set by nature afforded the hint to those who introduced the practice of docking the tails of sheep. One of the *Cercopithēci*, or tail-bearers, (a numerous branch) called *Midas* from the "monstrosity" of his ears, has a tail said to be three, and often four times, as long as his body. No person would believe (although all of this genus are pre-eminent among mimicks.—*Imitatores—servum pecus—)* that the first followed the example of Lord *Monboddo's* man; and, by some artful contrivance, cast a tail he once possessed; or that the latter had the faculty, by some kind of instinctive ductility, of running altogether into *length*, instead of *protuberance* of tail. And yet I cannot perceive why art, turning to its advantage the playfulness of nature, may not root out and abolish, or incontinently extend, as well as protuberate and store with materials for "plenty of grease for the toilet and the kitchen," the tails of whole races of animals and their descendants. Provided always that the fact, of its having been done in either case, can be established. It would be in the *Simiæ* tribe only, that one would look for and expect, "monstrosities, sports and whims, excrescences and deformities."

No class of animals exhibits a more curious and extensive variety than that of the *Simiæ*. With whatever contempt, disgust, or levity, they may be commonly regarded, they afford one of the strongest instances of countless diversities, both as to forms and capacities, to be found, in any one species, in the animal kingdom.

It is better to take things as they are, without speculating in unsatisfactory hypothesis; to which estimable men, of otherwise highly useful talents and propensities, too frequently addict themselves. *Nature*, in sober truth, is only secondary; and regulated by

> ——— "The universal cause,
> Who "acts to one end, but acts by various laws."

The omnipotence, wisdom, and goodness of the creator, are shewn in nothing more wonderfully, than in the endless variety of his works. We are not therefore to consider as unnatural, what is to us uncommon. All things were created perfect in their kinds. *Animals* (to fit them for dispersion to replenish the earth) were suited in their forms and systems, to the spheres in which they were respectively to live and move. Anomalous varieties are exceptions; produced by climate, accidental mixtures, and sometimes, 'tis true, by the intervention of the art of man. But these, and especially the latter, are limited in their extent and duration; and do not spread over vast regions of the earth; nor uniformly pervade whole species, and successive races and generations.

11th August 1810. I have never known 'till this day, that some Tunis sheep have been brought into Virginia, or the Columbia district, five or six years ago, by Commodore *Baron*. I congratulate those who possess them on this acquisition. I earnestly wish they may be more sensible of their value, than have been those on whom I had the task of operating,

in the commencement of my endeavours to spread them through our country. By this time the qualities of these sheep must be known to the Virginians; to whom I shall be obliged by information of their success. They will (if their sheep be of the race I have mentioned) smile, or be surprised, at my taking pains to describe its properties; or deeming it necessary to subdue prejudices against a valuable animal, which carries in itself its own recommendation; and requires only to be well known to ensure estimation. I hope the Virginia sheep are similar to mine. Tunis sheep have varieties, good and bad, like those of all countries.

The mild winters and early vegetation of Virginia, and especially of a grass called, I think, *oat grass* in their lower country, will enable the planters there, to go into the sheep business with great advantages. I believe many of them are convinced, that no change in their rural economy can be for the worse; in some parts of their country. It is indifferent to me what breed of sheep they adopt, if it be a good one. They will soon if they do not already know it, discover that race which best suits the climate and circumstances of their country.

R. P.

Certificates; and other Proofs.

We have followed the trade of *victuallers*, in the *Philadelphia* market, 25 years. We have killed very many sheep; of all breeds commonly sold in that market. The subscriber, *William Rusk*, has confined his business, to the killing and vending *sheep* and *calves*, for the most part; and has killed many hundreds of sheep, in every year. We are well acquainted with Judge Peters's *Tunis breed of sheep*; originating from his stock, but purchased by us from several farmers. They are the best sheep, compared with the general run of that animal, in the Philadelphia market. We have killed and sold them, for about seven years. They fat in the flesh, and on the ribs far superior to most others. The *rough* fat is as great in quantity as any common sheep; it being most distributed in the flesh. They fat with less food, and are the most healthy, of any sheep we ever knew. The lambs sell the highest of any in the market; and are the most sought after. We *never met with an unsound sheep*, in all our knowledge, of this breed. We have not kept an exact account of weights. We killed a ram of one year old, better than half blood, weighed 23 pounds a quarter, well furnished with rough fat. A ewe three quarters blood—two shears—20 pounds a quarter. A spring lamb bought of Edward George, 14 and a half pounds a quarter—killed the 10th of June; 20 pounds of gut fat in the ewe. Major *Reybold* in Delaware county, bought a three quarter ram of this breed from us. He weighed, alive, 214 pounds. The wool of the full, or high blood, or when crossed with good fleeced sheep, is in great estimation; and yields more to the fleece, the flock through; than any other breed we have been acquainted with. Witness our hands, 16th May, 1810. Signed,

GEORGE LENTZ.
WILLIAM RUSK.

Test. JOHN THOMAS.

These victuallers, and others, vouch for another fact. The Tunis lambs and sheep, under, or arriving at, yearlings, fat as fast as any others at maturity.

I have been a victualler in the Philadelphia market very many years. (Above 30) I kill as good, and as many sheep of all breeds, as most butchers in the market. The vending of *mutton* is my chief employment. I have seen the certificate of *George Lentz* and *William Rusk*, relative to the *Tunis sheep* from Judge Peters's stock. My experience of the general character, weight, and fatting of the sheep, agrees with theirs. Save that I have known some sheep, especially some of the Leicester breed from Jersey, lay on fat as well. The lambs are always fine; and the fat as well dispersed through the carcase of the sheep, as any other breed I have met with. The fat is always white; and the colour of the meat, the best of any mutton I know. Witness my hand, 21st May 1810. Signed,

JOSEPH GROFF.

Test. THOMAS BONES.

Mr. *Groff* farther observed—That the hind quarters always weighed peculiarly the heaviest. This was accounted for by the weight of the tail. Few aged wethers have been killed; the fine rams having been kept for breeders; and too many of the lambs killed.

Copy of a Letter from Major PHILIP REYBOLD, *Grazier and Victualler; to* RICHARD PETERS.

I have been brought up to, and followed, the trade of a victualler, and have attended the market in *Philadelphia*, for myself, sixteen years and upwards. I think I have killed as many sheep, as most victuallers that have attended this market. I am, however, sure, that I have killed more of the *broad-tailed*, or, as they are called, *Tunis breed* of sheep, than any other person. I have killed upwards of TWO THOUSAND of the latter. I have killed the *Merino;* and the *Bakewell* and *Wall's breed*, originally from *England;* the *St. Johns;* and all the various other kinds of sheep: and I am decidedly of opinion, that the *Tunis breed* is preferable to all others, for the goodness of meat. They fatten on the ribs, and through the flesh, better than any others; and the meat is superior in flavour; and will sell, to judges of good meat, more ready than other mutton, or lamb. The lamb is sought after in preference to all others. I have known them to be put with other sheep, at many times, and at various seasons of the year, to pasture, to fatten; and, in every instance, the *Tunis* sheep fattened the most speedy. It is a great mistake that they fatten only in the tail. They fatten in all parts. It is not confined to any particular part of their body. The sheep are uncommonly healthy.

I have slaughtered half blooded, and three quarter blooded lambs; many of them weighed 14 and 15 pounds the quarter.

It is a fact, that these sheep, at a year old, fatten as well as other sheep at a more advanced age.* And I have so

* All experienced farmers, graziers and victuallers, know, that it is a rare quality in young animals, either sheep or cattle, to fat in any degree equal to those aged. The food, in others than the *Tunis* breed, encreases the growth and size, without adding to the fat; in any important proportion. R. P.

great an opinion of their goodness, and of the advantage to graziers to breed from them, that I have taken a number of them to the grazing farm in *Delaware state;* for the purpose of breeding from them.

PHILIP REYBOLD.

May 22d, 1810.

I certify that I have in my flock, a *Tunis*, three quarter blooded ewe, in perfect health, fat; weighing 175 pounds, her fleece off. She was got by Judge Peters's original ram *Caramelli*, and is now rising nine years old; has never been sick or diseased in any way, and in 1808 weighed 192 pounds; after shearing eight and three quarters pounds of washed wool. None of my sheep of this breed, except one who was injured by eating *Laurel*, were ever in the least subject to any complaint, usual with sheep; during the nine years that I have raised annually from 20 to 40 lambs of this breed: although in my flock, I have constantly had common sheep affected with the several diseases incident to that animal. I have this day examined the ewe first mentioned. She has not cast a tooth; and has now eight teeth, as perfectly sound, and as well set in the gum, as a common sheep at four years old.* Signed,

THOMAS BONES.

Witness, CHARLES ROSS,
SAMUEL BRECK.

Lansdown Farm, Blockley township, July 11th, 1810.

* It is well known to farmers, and sheep breeders, that, in place of lambs teeth, a sheep in its second year, gets two teeth; in its third it has four; after three years old it has six; and in its fifth year, eight teeth; when its mouth is full. Very soon after all its teeth are perfect, the mouth begins to break. Most sheep begin to fail in the mouth at six years old;

I have taken the liberty, with a worthy and intelligent correspondent JOHN GIBBES Esq. of *Charleston*, who is among the most respectable planters in *South Carolina*, to extract from his letter to me, dated 18th June last,—the following paragraphs. I had sent from my little farm flock, and purchased from others, for my *Carolina* friends, within the two or three years last past, a number of fine *Tunis* sheep, of various grades of blood, from fifteen sixteenths, to half blood. They had notice of my opinions and experience, as to colour of fleece; either from myself directly, or through *John Vaughan* Esq. who transacted the business for them. But to indulge habits, in them, of predilection for white wool, I was obliged to select some sheep, not perfectly agreeable to my own judgment.

R. P.

July 7th, 1810.

"I am so much pleased with these sheep, that I have again "written to Mr. *Vaughan* to send me four ewes and three "ram lambs, if they can be obtained of the three quarter-"blood; and choice short legged sheep; and have requested "him to procure one of the ram lambs, or a ram, of the best "blood possible. *These sheep are much spoken of in Carolina,*

though many not 'till seven: few remain full mouthed at eight years old. I never saw one of the common sheep entirely free from some blemish; but have known the greatest number, at that age, destitute of several teeth; and with mouths in very bad condition; though they will feed tolerably. It is rare for them to breed after seven or eight: though there are instances of it, at nine or ten. It is very uncommon for sheep to have strong and healthy lambs after eight years of age; this being what may be called the age of a sheep; as it respects health, vigour and usefulness. The Tunis sheep is the only exception known to me. Mr. Bones's certificate will apply to all the breed. As to diseases of sheep, the catalogue would be very small, if all flocks consisted of this race.

R. P.

"and *are generally approved of*; and I am very desirous to "procure a ram as near to the true breed as possible. My "object is not profit; but to gratify a delight I enjoy in see-"ing fine sheep: and this breed appears better calculated for "our climate, than any race I have met with, either in *Eu-"rope* or *America*.

"The form of the ram I have received is remarkably fine; "but the ewe is too long in the legs; and does not suffici-"ently bear the marks of the *Tunisian* breed. I now per-"ceive my error in attending too much to colour; as the "*mottled* sheep which have arrived in *Carolina*, are observed "to be, invariably, superior to the *white* sheep; both in form "and fleece. This difference I presume, arises from their "nearer approach to the true breed. The *white* resemble "our native sheep."

It has become, I perceive by Mr. Gibbes's letters, a custom, to send, coast wise, in large quantities, the wool of southern flocks, to Philadelphia (and perhaps to other manufacturing cities and places) to be made up into cloth for their house servants and field slaves; similar to what are called the best *plains*; and it is done to their satisfaction. Let the Carolina gentlemen select out of the finer parts of the best Tunis fleeces (as I have done) wool for their own wearing. I will be responsible that their coats will not be disgraced in a comparison with any cloth (if well manufactured, and this can be done) of the best wool of this country. The Merino cloth I always except.

R. P.

June 7th, 1810.

On Tunis Mountain Sheep—WOOL.

That I may complete the account of this sheep, I shall, as opportunity offers, collect and communicate facts respecting the *wool:* but, I fear, too few have sufficiently attended to it; the *mutton* having been the principal object. This has been a mistake almost as gross, as its opposite extreme, of making the use of the animal, for the most part, if not entirely, to consist in bearing a crop of wool. Most undoubtedly this is an important faculty; but it should be combined with other qualities. The *eaters*, in a general convention, would far out vote the mere *manufacturers*. The side of the great majority would be that—of fine mutton and a comfortable coat—in preference to a very superior garment, and proportionately inferior esculent. Very fine wool, and prime mutton are rarely, if ever, found together. If they can be combined, as it is alleged they may.—it is "a consummation devoutly to be wished."—And the experiment is well worthy our unbiassed attention, and best endeavours.

The great body of farmers (however it may be with a few) will find their account under present circumstances, in the sheep, whose carcase both for quality and size, is always in demand for the market; and its wool sufficient in fineness and plenty, for all purposes commonly required; of whatever breed it may be. Few *Pennsylvania* farmers could, or would, keep a flock, merely for the fleece. It is the general custom, to cull the flock after shearing; and sell the fat sheep to butchers. No temptation of wool, would induce many to

change this habit: especially those whose pastures are luxuriant, and fatten the sheep quickly. Flocks, on pastures overstocked, are thinned, by sales of those fat, and of store sheep, for others to feed. Habits, good or bad, are not easily discontinued. If flocks for fine wool, can be made a special business, none can wish more sincerely than I do, for its accomplishment. To preserve them, other good breeds should be encouraged.* When this plan is extensively executed, millions of acres, at this time called *barrens*, will be converted into sheep walks. They now throw up, in cleared spots, white clover in abundance. The difficulty will be *winter food*, for large flocks; or, what is more unattainable, *early spring succulent fodder*, when they most re-

* In Great Britain, there are fourteen distinct varieties of sheep, some of them as indifferent as any we have. It would be an useful inquiry, if measures for ascertaining and distinguishing the varieties of sheep in our country, were taken. In all breeds, the wool should be an object of great attention, but it has been too much neglected. Breeds might easily be kept distinct, and not (as they too often are) indiscriminately mixed. The long wool and the short, the fleeces being applicable to different fabrics and uses, might, with no difficulty and a little care, be always kept from mixture; and each brought to its appropriate perfection. If it be thought, as no doubt it will, that I have been prolix and too minute, let others condense their accounts of breeds and qualities of sheep. So that, when every information is gained, a fair competition and emulation may be excited. This will effectually improve all breeds, and greatly conduce to the public prosperity. In England, and all countries, particular breeds have the *run* of the day, get out of fashion, and yield to fortunate competitors.

quire it. Our winters, and other circumstances, forbid turnip-culture, in the extent practiced in Europe.

I have recently had much gratification in visiting the establishment of Messrs. *Dupont* & Co. (near Wilmington Delaware) for the manufacture of gun-powder. Mr. *Dupont* will do our country important service, while he gains, for himself and his associates, well earned reputation, by bringing to perfection a nationally interesting manufactory, on a very extensive scale. It is not without some knowledge of the subject, (to which my public duty called my attention during our revolutionary contest) that I express my conviction, that these works are well worthy of national patronage; though, fortunately, their proprietors, by their own efforts, will ensure success; now they have overcome the difficulties, which, heretofore, they have encountered. It would do honour, in any country, to those who should found and conduct, such an establishment.

That he may, in some degree, balance the mischiefs, in which the lethal means of destruction he furnishes, involve mankind; Mr. *Dupont* (in connection with the company) is commencing a work for their comfort and preservation. It is a large *factory*, for woollen and cotton fabrics; to be conducted under the charge of his brother. As much to set an example, as to assist his views in manufacturing, he is (in conjunction with Mr. *Bauduy*, one of his partners, who has some fine sheep on another farm) beginning a plan for establishing a flock of *merinos;* in which he has made very promising progress. His ram *Don Pedro*,* is of the perfect breed, and his

* The projecting *occiput* of the *merino* head, behind the ears and horns, (of which latter *offal*, it has a plentiful sup-

wool far exceeds any *I have seen* (for others may be equal

ply) and the *dewlap*, or pendulous skin under the neck and throat, are marks of blood and race. I cannot conjecture why these should have been overlooked or forgotten, when the *broad-tail* was called a sport of nature. I saw in *Don Pedro*, the first *perfect merino* sheep, I had ever attentively examined, when stripped of its fleece. If the *merino* should be of *African* origin (as some suppose) nature, in that quarter, is singularly playful; and addicted to strange pranks in the animal kingdom: if it be really so, that *broad-tails*, *bunches*, *protuberant occipita* and sheep's *dewlaps*, are her sporting amusements: and I see not that she should be confined to any one, (if so they are) of these eccentric fantasies.—But the truth is, that in *Africa* there are more original indigenous varieties of *animals and plants*, than in any other quarter of the globe. It was the scene of primitive *creation;* and not of nature's sports.

It is common, I perceive, to dock the tails of *merino* sheep. A question of Mr. *Dupont's*—"Whether I thought that of the *Tunis* sheep could be safely cut off?" (which he asked with a view to its facilitating the crossing a ewe with his ram) reminded me of an omission in my remarks on this sheep. The configuration of the under part of the Tunis tail, assists in carrying off the excrement; so as not to foul the wool; and to preserve a general cleanliness in the hinder parts.—This sheep rarely *scours;* as do common sheep on succulent pastures; owing to weak or diseased bowels. The operation of excision, of the whole tail, would not be safe; nor do the reasons exist, as to this, which induce the docking other sheep. We sometimes cut off the supplementary curl or tail, below the fleshy protuberance. This may be done with perfect safety, though it disfigures the tail, and is not essential to cleanliness. Crossing can be accomplished with no great difficulty, but it requires some management. It is frequently effected, without any auxiliary means, with a *Tunis* ewe.—

R. P.

to it) except that from Mr. *Livingston's* stock. I enter into no comparisons on this subject; not professing to have sufficient qualifications for it. The celebrity of Col. *Humphreys's* sheep and wool, is generally known. But I have never seen any of his prime sheep, nor their wool; though I have seen many of the mixed breed from his stock. I had with me at Mr. *Dupont's*, samples of the *Tunis wool;* which I had the opportunity there of comparing with several specimens of the *merino* fleeces, from several quarters. With Mr. *Dupont's* wool, mine will bear no comparison. But I was myself surprised to find, that the wool of the ewe No. 2, in the plate, will compete with, and is considered by those who are judges, as fine in its fibre as, that of a sample of real merino wool, off a sheep imported into New-York from Spain; and offered, with several others, for sale; at the price of 1500 dollars each. I should once have thought my own, and more particularly this merino wool, of a very extraordinary degree of fineness. But it required very little discernment, to distinguish the difference, in favor of Mr. *Dupont's* wool. I know mine (when justice is done to a flock, in selection and keeping) to be evidently superior to most, and equal to any, of the wool I have compared it with, except the merino. I have sent herewith samples, by which my opinion may be tested. And yet the *Tunis wool* is by many, held in disrepute; because those who have these prejudices, have met with fleeces from crosses with coarse wooled sheep. I have myself seen multitudes of mortifying instances of this kind of inattention; and especially where large, or white, sheep, were the objects of crossing.

It is far from my intention, to hold up this wool, as to fineness, on any equality with a good merino fleece.

But I wish to rescue it from mistaken and groundless objections, and to establish it as a most valuable household material; as well as for general purposes required in a woollen manufactory.

Breeding IN AND IN.

Mr. *Dupont* believes (as do others) that he can, for any length of time, continue the race, in size and purity, by breeding *in and in.* As my experience, on the scale with which I have been acquainted, both in my own attempts to preserve the blood and breed of sheep, and other domestic animals, as well as in the practice I have observed in other farmers, has been otherwise; I requested him to continue crossing and bringing up the blood in that way—as a branch—in combination with his plan of breeding from the same family. But he seems to prefer the latter exclusively; though he is now, from necessity, obliged to cross. I never enforce for the sake of mere argument and persistence, any opinion of mine. I am free to grant, that if *selections* of breeders of the same race, are made from several extensive flocks; and the better if locality be distant (as was done in collecting, ameliorating and continuing the *Rambouillet* flock) much more certainty would exist. Perhaps permanency in blood and qualities, as well as size, would be ensured. The next best step, where the flock is small and fixed to a spot, would be to kill off, or sell to butchers, as I have often done, all inferior sheep and lambs, (and a good mutton sheep is on this account preferable) and keep none but the most promising for breeders. Probably *selecting in a very large flock*

of the same race, though it may be stationary as to place where it is kept, the best and most promising (of both sexes) for breeders which should have no intercourse with inferior sheep, would effect the purpose. I could enumerate many instances (some very recent) occurring under my own observation and that of others, in my own and neighbours flock's, where interchanging our sheep with distant farmers, for one or two seasons, has, in a most evident degree, materially improved the subjects of such changes, in fleece and every other respect. But where the parent stock is confined to a few, kept for a length of time on the same spot; I never could, with all the care I could take, prevent degeneracy in the full-blooded progeny of the direct line, after a few descents, the number of such descents being uncertain; and not governed, as to this effect, by any fixed rules. The deterioration frequently, but not always, shews itself in the third or fourth descent; when, in the same number, the blood, size and fleece, brought up by judicious crossings, are approaching to perfection. It has been almost invariably so, in cases falling under my observation; and these have been numerous. To some of those who are of a contrary opinion, I am ready to yield, in doubtful, speculative, or abstract questions; but I cannot, in this, be so compliant, as to abandon the repeated evidence of my senses.

RICHARD PETERS.

June 8th, 1810.

I never heard of any difficulties or accidents in *yeaning*, occurring with Tunis ewes. They are broad and roomy in the quarters; stand wide on their hind legs, and, being strong and healthy, they have easy births. R. P.

On Sheep-killing Dogs. By Richard Peters.

Read August 14th, 1810.

Since my communication respecting the *Tunis sheep*, and their *wool*, my flock has been attacked, and much injured, by *dogs;* the flock having been imprudently left during the night, by my tenant, in a frontier field; instead of being penned, near home, at nights, as should be done by every careful keeper of sheep. Caution is not always fortunate, but it should always be awake.

A single dog will commit extensive ravages; but most frequently dogs prowl in pairs, or greater numbers. The flagitious sagacity of dogs is almost incredible, when they are addicted to sheep-killing. They often kill both in the day and night; but more commonly in the grey of the morning, as do the human savages of our wilderness. Of this vice, when it is once fixed, they are never cured while living: death is the only effectual remedy. When a dog has *set* his devoted victims, he frequently collects confederates, to assist in the slaughter. They adroitly pierce the jugular vein, and gorge themselves with blood. They will not at first devour the flesh, if there is blood sufficient to glut them. They leave the carcases for a second repast, on returning to the field of carnage. In this second expedition, they expose themselves to the revenge of a watchful marksman; and are often shot, while on their march, or feeding on the dead bodies. They do not always return, but seek for more victims; preferring another feast of blood, to the flesh of those already slain.

The flesh is rendered worthless by their rabid bite, and rapidly putrefies.

A gentleman, from *Maryland*, informed me, that, in his neighbourhood, a *dog-trap* was constructed, of strong common fence rails, and so formed, that dogs can enter (inclined poles being placed outside, as gang-ways) but cannot escape. It is a strong pen, raised eight or ten feet high, and horizontally covered with heavy rails, except a small opening in the centre, through which a dog leaps down. It is baited with dead, or worthless living, sheep. Recently, near his residence, *seven* dogs were, in one night, caught in this trap. They had killed, in that neighbourhood, within the ten days preceding, 130 sheep.

A flock, after being worried by dogs, does not soon recover from the panic excited by their misfortune. But in time they become tranquil; though, at first, the distant bark, but more the sight, of any dog afflicts them with dismay. Their consternation, for a time, imitates, in an humble degree, that of *Milton's* victims to more fearful and merited vengeance; when

——" Horror on them fell,
And horrid sympathy."

But I do not perceive, in my dicomfited flock, that the *lap-ear* is in the least erected, under their continual apprehensions. Their ears (which they project frequently, but do not much elevate) still remain pendant; yet, if they have any consciousness on the subject, they must feel a conviction, that their protector-*man*—has not been vigilant in his guardianship. Their *legs* have the most sympathy with their fears, when a dog presents himself to their view. Though generally quiescent, yet,

on such occasions, as well as in their sportive frolicks, they decidedly prove that " the shepherd who first observed this *Lusus Naturæ*," had none of this race "in *his* flock. So far are they from being "unwieldy," that, when terrified, or playful, operated upon by different stimuli,—they are "swift as the roes on the mountains." Thus were of old the *Gadites;* who, being of the country in which broad tailed sheep originated, and were universal, *probably* were masters of flocks composed of this race of the *Laticaudæ*, if they were as wise as they were valiant.* But it often happens, that sheep in their flight, however rapid at times, face frequently round; and, torpid with fear, await destruction.

A spirit for extending profitably our attention to the raising this highly useful animal the sheep, appearing now to be alive in all quarters of our country, it is our interest, as well as a duty we owe to the community, to be assistant in every way; and particularly to the execution of the laws on the subject. It is in the power of every body to assist; positively or negatively. No unnecessary dogs should be kept. If numbers were lessened, those retained would be well fed; and few or none compelled to wander in search of prey. Not only *sheep killing*, but *diseases* and *madness*, in dogs, are frequently effects, either immediate or consequent, of keen and long continued hunger; which stimulates to gorging voraciously on whatever esculent they find; and not seldom on putrid and unwholesome food. The rabid

* It is not improbable that the kind we call *Tunis sheep*, are to be found in parts of *Asia;* where the *Laticaudæ* are of great varieties.

and feverish thirst for blood, is a species of mania; and it is sometimes the forerunner of complete canine madness. Sheep-killers can often be distinguished by a sharp and wild yell; very different from the tones of other dogs.

Our *dog law* is a good one; and it does not exclude the remedy, at common law, against a person keeping a dog knowing him to be addicted to sheep-killing. Our act imposes a tax on dogs. For one dog it is light, for a second, kept by the same person, or in the same family it is heavier; and it is so increased for a third, or a greater number, as to amount, if not to a prohibition, at least to a check, on the unreasonable multiplication of the numbers of dogs. The tax is paid into the county treasury. The value of sheep killed by dogs is ascertained by the persons chosen, in every township, for the settlement of township accounts; and paid out of the county treasury, on the certificates of the appraisers. The balance remaining, after the demands on the fund are satisfied, is to be laid out, by the county commisioners, for the purchase of *merino*, or other good sheep; to be distributed for the benefit of farmers, in a mode prescribed. In the city, the tax is applied in relief of the poor rates. Those who are notified that their dogs have killed sheep, must kill *them*; or subject themselves to consequences.

This law is intended for the protection of valuable property; and to encourage the breed of the best races of sheep. Appraisers should enter into its spirit and meaning, by just valuations of sheep killed by dogs. If they make no distinction between good and ordinary breeds, one great object of the law is defeated. Speculating and capricious price should not, 'tis true,

be the criterion: but a reasonable and current one, for the *kind* of sheep, and its use to the owner, *while living*, should certainly be the rule. Instead of viewing the subject in this light, I have been informed of some instances, where the value of a number of sheep, of an estimable and uncommon race, was fixed at the price butchers would give, for common sheep devoted to the knife.

Many dogs are faithful and useful animals, essentially necessary to the safety of our property,—even that of our sheep,—to our innocent and healthful amusements,—and to many profitable pursuits. There should be no hue and cry, or ill founded prejudices, indiscriminately raised against them. But they are kept in too great numbers, and of breeds, in many instances, worthless; and many, being ill fed and hungry at home, are compelled to prowl for sustenance.* It should be made disgraceful and *uncivic*, in those who keep supernumerary, worthless, or starved dogs. They injure society, by exposing the persons of their fellow-citizens to disease and death; and their property to plunder and destruction, when such dogs become mad, or ravenous *beasts of*

* A baker's man was serving bread to a family in the city, at a house in which I was at the time. He had with him *three* large dogs; and I expressed my surprise at the number. He said *they* were not the whole of those kept by his master; who had,—big and little,—*eleven*.—I asked how he could support such a number? the reply was—"easy enough;—they supplied themselves through the town;—and often brought home *some pretty good things*."

R. P.

prey. No person should hesitate to sacrifice a vile and vicious dog; but, on the contrary, should assist in detecting and punishing his enormities. Many dogs will, however, chase sheep from wantonness, or ill temper; who have not the vice of sheep-killing.—They should be at once chastised, checked and watched; as it may lead to vicious habits.* But I have known dogs worry, and even bite sheep, as they would tresspassing hogs, or cattle, who are not to be numbered among the *blood-sucking* (for this is the test) gang of sheep-killers.

A great number of my friends, through life, having been *sportsmen*, I would very unwillingly offend those who occasionally devote themselves to the amusements of the field. I have never disregarded the old saying—"love me, love my dog."—But truth compels me to say, that I have found among sporting-dogs, some of the worst enemies to sheep. Hounds are the most atrocious; and some pointers, spaniels and other water dogs—bad. I join in detesting curs and mongrels, they being proverbially vagrants and sheep-killers.

How to regulate the keeping of dogs, so as not to lessen their benefits, while we are correcting their abuses, is a difficult task. In Great Britain, their varieties of

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* A young dog, having wantonly bitten and mangled a large lamb, so that it died, was muzzled by one of my servants, and tied to the dead lamb, for a day and a night, and severely beaten. He was entirely cured of his propensity for chasing sheep; and would never afterwards approach them.

R. P.

dogs exactly equal in number that of their varieties of *sheep*; yet, I believe, fewer injuries occur from dogs; owing to a strong sense of the value of sheep inducing more care, and more strict attention to the execution of the laws. It would be beneficial to collect the regulations, whatever they may be, of all countries on this subject; and epitomise, into a little code, such as are applicable to our circumstances.

RICHARD PETERS.

June 11*th*, 1810.

To the Philadelphia Society for promoting Agriculture.

Explanation *of the Plate.*

No. 1. A three quarter blooded RAM—four years old—chiefly white fleeced. White face—cheeks and legs, tawney. A handsome, healthy, vigorous tup. If there are any objections to him, they are, with me, that his fleece is too white for the breed; though his other characteristic marks are good. These sheep were drawn when the fleeces were of three months growth. When full fleeced the anatomy, figure and points cannot be correctly shewn. On this account, I rejected drawings of them taken when unshorn.

2. A full blooded EWE rising five years old,—a fine healthy sheep; from the original ewe *Selima*, and a full blooded ram. Cheeks black—face and fleece (with some dusky spots) generally white—legs swarthy. In every point an exact likeness of her dam; who was in her 12th year when the lamb was dropped.

Selima, in the year 1804, had her teeth in full perfection; and a mouth equal to any sheep at five years old. It has been gradually breaking since; she has now some teeth, and feeds well. I think her mouth is now as good as those of common sheep, at half her age. She is now in her 17th year; in perfect health, and retains her fleece; though it is much lighter than it was a few years ago, and in its fibre not as fine.* She has not in general been attentively kept, but has borne neglect without injury. She has never been diseased in any way; though she has constantly ran in mixed flocks, wherein al-

* Although these sheep will endure longer in health and qualities than others; and, while their numbers were few, it was necessary to preserve the stock, I do not approve of keeping aged sheep too long.

R. P.

most every disease, incident to sheep, has been frequent. She had lambs in 1807 and 1808, but, being lambed in an inclement season, they died. One of them was not a healthy lamb.

The old ram died, in Lancaster county, at about 15 years old, in health and vigour, by an accident in some rencounter. He must have been *out of luck;* for I have seen him in a furious and awful conflict, in which he finally defeated a powerful young bull, in my farm yard, after a bitter contest of half an hour's continuance. Though he received some bad flesh wounds, he eluded every attempt to toss him; and, at every fair opportunity, gave tremendous proofs of his being, literally, an animated *battering ram.* I had determined to shoot the bull, though a valuable one, to save the ram; as they could not be separated. While I went for a musket, the victory was decided by the bull's retreat. He was generally gentle, good tempered and playful, though sometimes rough in his *pleasantry.* But when enfuriated, he was fearfully ferocious. He had a mode, like deer, of striking with his fore-foot; so that the fiercest dog I had, dreaded and avoided him. He once saved a flock, by making battle against a dog, 'till a rescue arrived. All fled, but his partner *Selima;* who, fixed to his fate, stood aloof, at a small distance from the combatants, not willing to desert her companion, to whom she was attached by habit and instinctive affection.

I have mentioned these traits of character, in the original pair, because they descend, though not always thus strongly marked, to all the race; when care is taken of the crosses, and justice is done to the flocks.

3. A three quarter EWE, six years old. Generally white, with some tawney spots. Head, face, cheeks, and legs, tawney. Remarkably handsome; with all the points and qualities of the breed.

4. and 5. The tails of the ram and ewe reversed. Those of the ewes are always the smallest; as are the ewes themselves.

Many of this race are mottled or spotted with brown or tawney. The fewest have black spots; some are black entirely;—but in no greater proportion than other breeds.

I regret that I have (impelled by a desire to serve the interests of others) conceived myself under the necessity of so much enlarging on the subject of these useful domestic animals; which to many may appear not worth the pains. I am well aware that a very few lines, containing results of great pecuniary profits, would have carried stronger convictions, than a volume of other facts, or descriptions, written by a much abler pen than mine. If their value had been earlier and more generally known and attended to, I could have drawn together very important pecuniary inducements. If, even under all untoward circumstances, facts of profit could be collected; I should not fear to assert, that the amount would magnetically attract those, in whom emolument is the sole and dominant propensity.

R. PETERS.

It would give me much more pleasure, and to every farmer much more profitable instruction, to assist in diffusing the useful and valuable productions of Mr. Livingston, upon subjects beneficial to our agriculture and rural œconomy; to the prosperity whereof, his example, as well as precepts, have most essentially contributed. I think it just, however, that if I have misconceived what he has written, I may be corrected by his own words.

R. P.

Extract from the Essay on SHEEP—*their varieties &c. Pages*, 27, 28.

"The race of sheep that I shall next notice is one that is *more extensively diffused than any other*, since it is found throughout Asia and a great part of Africa, as well as through the north-eastern parts of Europe. I refer to the *broad-tailed sheep. (Ovis aries lati-caudata)* These differ as the ordinary European race in the nature of their covering. In Madagascar, and some other hot climates, they are *hairy*, at the Cape of Good-Hope they are covered with coarse harsh wool; in the Levant their wool is extremely fine, or in other words, they are *adapted to the necessities of the people* by whom they have *been changed from their wild to their domestic state.* These sheep *are generally larger than those of Europe*, in which circumstance only, and the form and size of their tails they differ from them. The broad-tailed sheep are of three species. In the one the tail is not only broad, but long, and so weighty, that the shepherds are compelled to place two little wheels under it, to enable the sheep to drag it. These tails are said sometimes to weigh from forty to

fifty pounds. Another species have the tail broad and flat, but not very long, covered with wool above, but smooth below, and divided by a furrow into two lobes of flesh; these are also said to weigh above thirty pounds: I should not however estimate the weight of those which I saw in the Menagerie at Paris, at more than ten or twelve pounds. *In some species a small thin tail projects from the center of this fleshy excrescence.* The composition of this excrescence is said to be a mixture of flesh *with a great proportion* of *fat*, and to be a very delicate food; *but the animal has little other fat, the tail being in him the repository of that fat which lays about the loins of other sheep.* In cold climates the fat of the tail *resembles* suet; but in warm ones, as at the Cape of Good Hope, Madagascar &c. it is *so soft that when melted it will not harden again.* The inhabitants *mix it with tallow* in certain proportions, when it *assumes the consistency of hogs lard*, and is then eaten like butter, or used for culinary purposes. *Naturalists* imagine that this excrescence is owing to some circumstances in the food of the sheep, which makes the *fat fall down from the loin into the tail*, and thus occasions this *monstrosity.* I do not, however, think this probable, since the *prodigious extent of country through which this race is propagated*, must render the food as various as the climates in which they are bred. I rather think that *it owes its origin to the art of man*, grounded on some of *those sports of nature*, which in all domestic animals, afford a basis whereon to *engraft his whims.*"

28. 29. "It may be asked to what end would man cultivate this *deformity*, and that too through so extensive a region as to forbid our attributing it to whim or fashion? may not *the shepherd who first observed this Lusus Naturæ* in his flock have concluded, that he had made a very valuable acquisition, since he not only had a sheep that gave him *as much wool, milk or flesh* as the rest of his flock, but *a tail*, which, *in addition*, gave him a comfortable meal, or *what is*

still more valuable among savages, plenty of *grease for his toilet and his kitchen.* This circumstance alone would make him attentive to *cherish and propagate the deformity;* and the rather as he must soon have found that it was attended with another important advantage; the sheep being *more unwieldy*, would be less apt to stray or return to its savage state; an object of considerable importance in the early state of society.

Proofs of the Originality, and high Estimation, of Broad-tailed Sheep.

Having found, for some years past, that *old wine* is not to me the *milk of old age*, I have contented myself under the privation; but have not parted with a moderate share of relish *for old books*. The oldest and the best of all books, and the commentaries of some of its most instructive annotators, afford most satisfactory proofs of the originality of the *broad-tailed sheep*. The discovery of the animal, or its uses, were not left to the fortuitous observation of an ignorant shepherd; nor was the tail devoted to "the toilet and the kitchen," of the occasional tenant of a mud-built hovel. The learned, splendid, and instructive work of SCHEUCHZER, entituled "PHYSICA SACRA," printed at *Ulm* in Germany nearly 80 years ago, will furnish to those who have the curiosity to turn to it, a full account of the OVES LATICAUDÆ.* In the plates CCIV. CCV. Tom. I, pages 232, 3, there are drawings of these sheep (one very like my ewe No. 2) and of the ceremonies in placing the tails on the altars, by the priests of the Israelites. These plates would do credit to a modern engraver. They are intended to elucidate his learned commentary on the 22 verse, of chapter 29, of *Exodus*. The whole work is calculated to prove the agreement in the accounts given by the sacred writers, with what is known in modern times, in natural history, and the arts and sciences; whereof this extensive and amusing work, embraces the whole circle of knowledge in his time.

The words in our translation are, "and thou shalt take of the ram, the fat and the *rump;*" which *Scheuchzer* translates from the Hebrew "Tolles quoque adipem de ariete, et *caudam.*" "Thou shalt take the fat of the ram *and its tail.*"

* *Broad-tailed sheep.*

The *Israelites* were expressly enjoined to select *the best parts of the victims* for the sacrifices; but he cites *Tertullian* to reproach the *Pagans*, who placed on the altars of their false gods the worthless parts, and reserved the best for themselves; contrary to their own sense of propriety. He shews that the sheep of *Syria*, *Arabia*, *Persia* and the *African* sheep generally, were of the broad-tailed race; and that the tails of other sheep were not worthy of consecration. The Hebrew word for the *Laticauda* is אלית—*Aliah;* but that for the tails of other animals is זנב—*Zanab;* and the modern *Arabians* preserve the same distinction. In *Greek* versions, the word οσφὺν, and not κεκοσ, or ὲρὰ, is used for the *Laticauda*. He describes the varieties of the *Lauticaudæ;* and adds—"sunt hujus modi caudæ delicatissimus cibus."—The tails of these sheep are the most delicate food:—and as such were worthy of being devoted to the altar,—to fulfill the express injunctions of the scriptures. He produces authority from ancient writers to shew, that, according to the Jewish customs and rites, these *Laticaudæ*, being "*partes opimas victimarum*," (the richest parts of the victims) were thus devoted. So that we find a more dignified and pious use for the *Laticauda* than that of furnishing "plenty of grease for the toilet and the kitchen," of a squalid tender of sheep.

Under the old dispensation, the *Israelites* were bound to sacrifice the best parts of the victims; but *we* are now only called upon to lay on the altar, (not in honour of our creator, but for our own purification) the worst parts of ourselves. And notwithstanding it is a religious and moral duty, to sacrifice, among those parts, an unwarrantable thirst for gain; yet this selfish indulgence *sometimes* benefits society; although the sophisms of the author of the "*Fable of the Bees*," are not generally justified. The high prices obtained for *merinos* have roused American enterprize. This crouds into our ports, and plentifully adds to the wealth of our country (procured from the wrecks of the fortunes of their former European proprie-

tors) those most valuable animals; a small number whereof had been, here, in the hands of a very few persons. It would now be as difficult as unnecessary, to enumerate the individuals who possess them. Instead of its being a rarity for me to see fine sheep of this breed, they have already become familiar: and that by an accumulation so rapid, as to appear a kind of magical delusion. Accessions must continue to arrive; for speculation is alive and active. Their depressed owners must part with precarious property; and the patriots of *Spain* willingly assist in thinning their country, of these subjects of monopolies, which have long been its scourge.—The laws and regulations in *Spain*, on the subject of *sheep*, have ever been oppressive on the people, and injurious to the agriculture of the country. The flocks and the system will dissolve together. Whatever may be the final fate of that country, it will be, for a long time, too much disturbed, to suffer the flocks, or the system, to remain on their former establishments.

Regaled as I have been by my excursion among the *merinos*, I return, however, not only with undiminished, but with increased pleasure, to my *Tunisians;* and the old author who celebrates their progenitors. He cites *Herodotus* b. 3. c. 115. *Aristotle's* account of *Syria*, Hist: b. 8. c. 28. *Diodorus* b. 2. *Pliny* b. 8. c. 48; and other antient authors (several whereof I have examined) as proofs of the description and good qualities of this race of sheep, in times the most remote. We, in our day, have the opportunity of testing, *by easy and agreeable experiment*, the verity of these old authors. We may compare them, too, with the more humble, but equally just, proofs from the practical witnesses I have produced. I took *Scheuchzer's* advice. He tells us "that to explain such texts, and others like them, we must not only enter the storehouses of grammatical and other learning, but we must go into the slaughter-houses of the butchers;—"*intranda lanionum laboratoria*," as well as into more elevated anatomical theatres.

THE CARCASS (which is as much entitled to celebrity for its mutton, as is the merino fleece for its filament) must not be forgotten. It wants no other proofs of its excellence, but the "intranda lanionum laboratoria." Yet we may find such proofs now, as well as in ages the most ancient; and by testimony the most convincing. The flesh of all victims sacrificed for sin, were wholly the perquisites of the PRIESTS of the Israelites; save when sacrifices were made for their own, and the sins of the whole congregation. In other sacrifices, designated parts, or portions, were assigned to them. PRIESTS, in all ages, have been practical judges of *good living;* and, when they can righteously obtain it, are now so. I say not this to the disparagement of modern priests, for no one respects them more than I do; nor is any one better satisfied than I am, that those who serve at the altar should live well by it. The divine author of the regulation, which demanded sacrifices of of the "*adipem et partes opimas*," ordained, that the victims, of course, should be of the fattest and best animals. Worthless perquisites might have induced *Pagan* temptations, to lead astray the *Israelitish* ministers at the altars. The richest parts, 'tis true, were devoted; but for *their repasts*, food sufficiently inviting remained. Only the fat which could be easily separated (see Leviticus, iii. 16.) was the Lord's; (Humphreys's annotations 233) but "that which was intermixed with it, the Jews ate freely of: the Gentiles also devoted the fat to their gods."—But in *their* feasts on the carcasses, the latter indulged in the most obscene and sinful orgies; and thought their gods partook of their gluttony and revels.

In Leviticus, chapter 22, and other passages of scripture, it will appear, that the offerings of beasts consisted only of beeves, *sheep*, and goats. For burnt-offerings the males were exclusively devoted; but for sin and peace-offerings, females might be used. They were to be without blemish, *i. e. hybridous mixture, deformity*, disease, or uncleanness. The *cawl* or *omentum*, and other separable rich and fatty parts, being holy when dedicated to the altar, it was indispensable, that the ani-

mals from which they were required should be fat. These sheep *(Laticaudæ)* then, were peculiarly fitted for holy victims; the carcasses being rich and fat, and the tails being formed not only as "*partes opimæ*," but as guards against *unnatural mixtures* with other animals. The cleanness and freedom from disease and vermin, established in their original nature, and, in a former part of these communications, proved to be now continued in the race, perpetuate the goodness and bounty of the creator; who gives to us, in our day, what, in the primitive ages, and under the old dispensation, he had devoted to himself: not as things which could of themselves delight him; but as testimonies offered in his worship, and proofs of homage and submission to his will.

Those who are not fatigued by the subject (as I confess begins to be my own case) may prolong their patience, and read (perhaps not unprofitably) the following translation of a passage from *Scheuchzer* Tom. 1, page 231.

After enjoining us to devote to the worship of God, our best affections, pure hearts, and all the precious propensities of our nature and systems, he adds——

"So in sacrifices was *the fat*, which is the most valuable fluid of the body. *Adeps* means a juice or fluid, fat, oleaginous, congested in certain strainers *(sacculis*)* and therein, after many elaborate and curious processes, secreted in a manner highly useful to the animal system. This is the essence of the nutritive juices, or rather a superfluous nutritive fluid, which *when aliment is deficient, flows back to recruit the mass of blood and other parts of the system.* This not only throws light on the text we have undertaken to explain, but on others before cited; according to the idiom of the language of eastern people. The God of *Israel* would

* Cells of the *membrana adiposa.*

not leave to discretion or caprice, what parts should be offered in sacrifices; but determined himself to select and enjoin them.

Scheuchzer was a celebrated physician and naturalist. His account of *fat* clearly refutes (if it wanted refutation, other than its evident improbability) the idea, that the fat of any animal can reside exclusively in any particular part, while other parts are meagre, and "aliment therein deficient." *It would flow back into the system*, to recruit and sustain it. Whatever may be the modern definition of the term *adeps*, it is well known that fat animals will live the longest, without any, or slender supplies of food. It is found in fact, that the tails of these sheep are small and flaccid, when the animal is generally lean. So that the tail cannot be (agreeably to the nature and structure of animals) neither in fat nor lean sheep, "the repository of all the fat," or any great proportion of it. And I know *experimentally*, that the Tunis tail (or *Alieh*) consists, in its interior, much of rich *mucilage*, without an undue proportion of fat.

A view of the Tunis sheep, or any other of the pure and choice races of the *Laticaudæ*, would supersede all necessity for any other refutation of this groundless opinion. It is only to those who have not seen or feasted on them, and have conceived prejudices, originating in misinformation, or want of sufficient reflection, that these observations can be, in an important degree, necessary or useful. Having long abandoned rich food, I leave to others the experiment and enjoyment of it.

RICHARD PETERS.

September 25th, 1810.

I have lately compared some of my *Tunis wool*, hastily plucked from the backs of the sheep, with many neatly displayed samples off fine sheep of the English breeds in New-Jersey; whereof that of the *south down* was the best. My best wool was the softest, and finest in the filament.

R. P.

Heads of Lease for Richard Peters's Belmont Farm.

Read 14th, August 1810.

Belmont, June 11th, 1810.

Dear Sir,

Being frequently called on for my lease, by those who wish to let farms on shares, I thought it would conduce to the information of all who were desirous to make such leases, to send to the society the heads of my lease. If they think proper, the enclosed may be published with our memoirs.

One tenant, on my *Bull farm*, has lived 15 or 16 years, under the terms stated in these heads or extracts. He has brought up reputably a large family; and has got much *before hand*, according to the country phraseology. Several tenants, on my Belmont estate, have lived five, six, and seven years, under this lease; and all have thriven. I have not been rigorous in enforcing my priveleges; or holding them very strictly to all parts of their contract. But I am satisfied that I have done myself none, and them little good, by this laxity. Small objects may be neglected; but every tenant is the better and more exact and regular, by being kept to his agreement. Relaxations, from motives of liberality, may be occasionally granted. But I have found in all instances, that though at first accepted as *favours*, they are claimed thereafter as *rights*. There must however, be confidence and liberality on both sides; or such a lease will be a source of constant, and vexatious altercation.

I believe it to have been occasioned as much by habit, as from conviction of its eligibility, that I have continued so long letting my farms on shares. I think more can be made in this way, if the landlord is strict and prying. But this has not been my course. I find that those who want watching the most, affect to be the most offended at even necessary and just investigation. In general I have lived with my tenants more agreeably (though perhaps not so profitably) than one who would hold a *tighter* hand.

The specific share received by the landlord is much the more easily paid or delivered by the tenant, in frequent portions, and, with short accounts. Such leases are favourable to tenants, in the highest degree; as the landlord partakes of all risks and losses by casualties and bad crops. One who has a money rent to pay, *must* pay it under all circumstances, of good or bad seasons, good or ill luck. I should prefer a money rent; if such could be justly fixed. But I have found great difficulties in ascertaining its amount; or getting tenants who would pay it. On the whole, though not satisfied in many things, I find myself as well as most who have let farms on money rents; and than some much better. The advantages and disadvantages of my lease, balance one another; so that on long trial, I find nothing hard or unjust; taken all together. Circumstances must vary contracts: but I think my plan and its details, must be generally useful, to all who desire similar agreements. It will be the more to be depended on, on account of its being tested by long experience; and cannot fail of furnishing outline; though the parts

may be variously filled up, accordingly as objects and circumstances require.

I have not ventured, with *a new tenant*, to give a lease for more than three years. Trials of temper, industry, and management, are as necessary, in this kind of co-partnership, as is integrity. Those who have given any tolerable satisfaction, have always remained. Several have held over under the terms, without actual renewal of the lease, for many years. And these terms have been kept (never as exactly as they should have been) as well without as with the renewal of the instrument. A perfectly good tenant in this country, where property is so easily acquired, is so rare; that I have generally found it *prudent* to be patient with one who was not absolutely bad; and to be easy, under many things I did not approve, with one above mediocrity.

Yours truly,

RICHARD PETERS.

DR. JAMES MEASE.

Secretary of the Philad. Soc. for promoting Agriculture.

Heads of Richard Peters's Leases to Tenants, on Shares:

Extracted from the Lease for Belmont Farm.

The legal form, is such as is common in leases reserving rent in money.—The specific share, or the produce of it in cash, when Richard Peters directs or consents to its sale, is subject to the legal modes of recovery; and its safety insured, by its being a lien on the tenants property.

1. The *premises set on shares* are clearly described. Reservations of such parts of the farm, *mansion house* &c. as are thought proper by the landlord are made. The *tenant's house and barn* &c. are at a distance from the mansion house; to prevent inconvenient interferences, and sources of petty contests.

2. A fixed quantity of *dung*, from the tenant's muck heap, may be taken if the landlord chooses. Also *straw*, not exceeding *an eighth part* of the whole.

3. The landlord is to put *all post and rail fences*, and the tenant *all worm fences*, in good repair.* The tenant to *hale* all materials, found by Richard Peters, for both. The materials for the latter, and posts for the former, to be taken out of the landlord's woods: for worm fences and repairs of post fences, (after being put by landlord in good order) at the tenant's expence, or by his labour.

* This applies to the first period when the tenant arrives. Afterwards he is bound to keep the fences in repair as they require it. It would be inadmissible and unjust, to let them rot down, and call on the landlord for entire new fences.

If the tenant leaves the farm at the end of one year, he is to be allowed a reasonable compensation for the repairs of worm fences. *Fences* to be left in *good repair.*

4. The tenant is to hale to Philadelphia *twenty cords* of *fire-wood*, cut and corded at the landlord's expence, at a stipulated price for hauling. If the landlord chooses, he *may use the farm team*, for hauling the whole or any part.

5. The landlord to have the use of *a pair of oxen;* (furnished by him, and supported on the farm) when he thinks proper.

6. *Pasture* is to be *allowed to the landlord*, for a fixed number of *horses* and *cows;* when he chooses to turn in the number stipulated, or any part.

7. Allotments of proportions *of all taxes* are made. In general half to be paid by each. So of *ferriage* and *pikage;* for transportation on joint account.

8. Neither the tenant, nor his family, are to pass through the reserved parts of the farm, without the landlord's consent.

9. *Fire wood* allowed for *two fires;* one whereof shall be in a stove. Dead and fallen timber, and tops off trees cut for rails and posts, to be first taken; and every kind of economy, as to timber, duly to be exercised. The part of the wood land for tenant's fire wood, is designated by the landlord.*

10. *No lights* to be used, about the *barn or stacks.* If this be done, the tenant is held answerable for consequences.

* It would be better to fix the quantity of fire wood, or its equivalent, if it be just that any should be allowed.

11. The tenant is to procure, and sow *clover seed* and *plaister* of *Paris.* The landlord to pay half the cost of purchase. The tenant must leave the fields of winter grain sown or not with *clover seed*, as he finds or not those on the farm, on his arrival, so sown, or not.

12. The landlord may kill or sell his share of *lambs*, or *fat sheep;* and so may the tenant. But the stock agreed on must be kept complete, at joint expence. *Ten wethers* may be added by the landlord for his sole use, to run with the flock in summer, if he so chooses; to be winter fatted at his own expence. *Wool* equally divided, and losses equally borne; unless occurring through tenant's negligence, or fault.

13. A fixed number of *swine*, the landlord's sole property, are to run, in summer with the farm stock.

14. When the landlord shall require the use of the *farm team*, it shall be driven by the tenant, or some person by him appointed. [But this is only occasionally; and must not obstruct the business of the farm, in the season when farming operations require the horses.]

15. The tenant to be allowed to take away as much *hay* and *straw* as he brings on the farm; and no more. The carrying off *hay*, *straw*, *dung*, or *ashes*, is prohibited; with the foregoing exception.

16. No *stock* to be kept for the exclusive benefit of the tenant, all, for sale or use, to be for joint account. Expence for *covering horses*, joint.

COVENANTS *to perform articles before enumerated; and some additions and explanations.*

1. Relates *to fences.* Landlord to direct *how fields are to be divided,* if such divisions are found necessary. All new division fences, directed by landlord, must be made at his expence. *Fences* being put in good repair, the tenant shall so keep them; the landlord finding materials as aforesaid, to be hauled by the tenant from any place not exceeding five miles distant. *Buildings* delivered *in good repair* are to be so kept by the tenant; accidents by fire, not occurring through negligence or fault, excepted.

2. Tenant to pay *taxes* in first instance; and landlord to allow the part allotted to him.

3. Landlord to pay for all *manure hauled* by *tenant* from other places; but landlord to decide on price. Tenant to use all possible care and diligence, to make and *collect manure* on the farm.

4. The tenant is *to do all the work on the farm* at his sole expence. To find all *implements of husbandry;* and articles necessary for the *dairy.* He shall sell and dispose of such products as are mutually agreed to be sold; accounting for proceeds: and sell landlord's share, or part thereof if so directed, as to any article or thing.

5. Manure to be laid on places only, agreed on by mutual consent. The *fields cultivated, quantity,* and *species of grain* sown, and the *general husbandry* to be fixed by both parties: and no *cropping,* or *cultivation,* but such as shall be mutually agreed on.

6. The *grain and other products,* usually so measured, are to be *divided by the bushel* (such excepted as are agreed to be sold and the proceeds divided) and delivered into *landlord's granary on the farm,* or hauled by tenant, if landlord so requires, to any mill or place not exceeding five miles distance. *Indian corn,* first divided and stored in the cob; but it shall be shelled or threshed by the tenant, when landlord requires. Half the *flax* to be delivered from the swingle. No grain to be stored, or kept by the tenant in the *dwelling house.*

7. Landlord to find, or, at his option, pay for, *one half of all seed;* whether for the *garden-truck, roots,* or *grain.*

8. *Landlord's share* shall *be delivered, or at his option safely stored;* and properly sheltered and preserved; or sold and proceeds accounted for by tenant, if landlord so require it.

9. *Landlord is to receive one half* of all *grain, butter,* or *other products,* and all *increase of stock;* or, if sold, one half of the proceeds, for all things raised on or agreed to be sold off, the farm. Nothing, produced or supported by the farm, is to be raised made or grown [in the operations of agriculture, grazing, dairy, or other products of husbandry and rural economy] but for joint benefit; and to be equally shared between the parties. If *bees* are kept, honey, wax or profits, to be divided; the stock originally to be furnished at joint expence.

10. Tenant to have out of the *garden,* what he wants for his family use. The residue to be sold; and proceeds divided.

11. The *number and species of stock* to be mutually agreed on by both parties; which is to be increased or diminished, according to circumstances. No *cattle*, *horses*, or *sheep*, to be taken or kept on the farm, but with mutual consent, and for joint benefit.

12. The tenant shall *do no business* other than that required for the farm; and such as may, by mutual consent, be connected therewith. If it be agreed to *graze*, or *deal in*, *cattle*, original stock to be at joint expence, but all care, labour, &c. to be done and taken by tenant.

13. Risk of *stock*, *horses excepted*, falls on both parties alike: save loss accruing from fault or negligence of tenant. *Colts* dropped raised or brought on farm, to be at joint risk and for mutual benefit.

14. No *inmates* or *lodgers* to be taken in by tenant.

15. Tenant to use every endeavour to destroy all *noxious weeds*, *briars*, *bushes;* and put and keep the grounds in the best order.

16. *The farm horses* or *team*, &c. shall not be used for any other purposes than those of the farm, without landlord's consent: save for the accommodation and convenience of the tenant and his family.

17. Tenant *not to sell any timber*. Only the cleared land rented; but tenant may have the range of the woods, if young timber, subject to injury, be not on the part depastured. No stone *quarries* opened, or to be opened, are within the lease, but reserved; and passages to and from them.

18. *All stock* whether for *dairy* or *grazing* are *joint property*, laid in at joint expence and for joint profit. But tenant *finds the horses* at his expence and risk.

They are supported with pasture and hay from joint produce; but not with short feed. Landlord finds and runs risk of a pair of *working oxen*. Tenant has the use of them, when landlord does not require them.

19. Tenant shall plant and preserve from injury of cattle &c. *fruit trees* purchased by landlord. No cattle or horses to be turned into orchards, without landlord's consent.

20. No *hogs to run at large* without *rings* or *nails*. If damage done by them or those of others, tenant shall immediately repair it. [Grass grounds shall not be pastured too late in the fall, nor too early in the spring, so as to injure future crops.]

21. If *lime* be put on the last year of the term, (or the first year, if tenant leaves the place at the end of it) and tenant receives no adequate benefit,—compensation is to be made for hauling. The landlord is *to pay cost at the kiln*, for all *lime* hauled by the tenant.

22. All the *hay* to be expended for joint benefit, as well as the *offals of the dairy* for support of the stock. Landlord finds feed for his share of hogs, when penned for fatting; or he may have them divided before putting up, and sell or feed his share. When jointly fatted, pork to be divided by weight, or sold and proceeds divided; or landlord's share sold for his benefit.

23. *Cyder* to be made by tenant; landlord finding vessels for his share; which shall be delivered either at the mansion house; or hauled to the city at landlord's option. If landlord chooses his *share of apples* in whole or part, tenant shall hand-pick, and deliver them, as before stated.

24. Possession to be delivered at the end of the term. The usual mode, with a new tenant, is to make the first year one of probation. Either party may give notice to the other, three months before the end of the first year, of his intention to dissolve the agreement. The lease is personal; and does not survive to representatives in case of death; save until the expiration of the year in which the tenant dies. All crops go to representatives; subject to the terms of the lease, and stock to be divided. The lease cannot be assigned, without landlord's consent.

25. The landlord's share is exempt from *debts* of, or *sales by, tenant* unauthorized: and may be distrained and taken; if not delivered on demand or otherwise. And the landlord is to have *free ingress and egress* at his pleasure into and upon the farm, buildings, and premises. If tenant leaves the farm, or dies, before reaping the benefit of any manure he has hauled, compensation is to be made. All differences to be left to referrees, mutually chosen.

26. It is declared and agreed, that the leading objects on this farm, are those of *cattle* and *dairy*. All *cultivation* is to be carried on with a view to these objects; and to such others as will produce profit in the Philadelphia market. The raising of *grain*, is always to be considered as subordinate and secondary to the end on which the agreement is founded.

Note, On Lease of a Farm, on Shares.

It is understood and practised, that timber found by landlord out of his woods, is *standing timber*; selected with his approbation. *Stock*, being always proportioned to the forage, *shall* be supported by the tenant. The landlord is not bound to support the joint stock either wholly or partially.

The tenant, having the care and charge of the *stock*, is solely answerable for tresspasses, if any committed by horses, cattle, hogs, &c.

On Liming Land. By Richard Peters.

Read August 14th, 1810.

The relation to the society in which I am placed by them, impels me to bring to their notice, many subjects, which I should not otherwise conceive myself bound to discuss. When no attention appears to be paid by others, to an important point, I venture to supply, however inadequately, the deficiency. This must be my apology for so often troubling them with my thoughts on topics, to which others, if so inclined, could do more ample justice. We have not a solitary communication upon the practice of *liming lands;* though carried to very great extent in our state. In no country is LIME in more abundance; nor can it be of better quality. Chemical and theoretical accounts of it, may be found in many books. There are good writers on its properties, as they apply to agriculture. But we find in those writers, many positions and remarks, both theoretical and practical, unsuitable to the climate and circumstances of this country. It is more a topic for curiosity than practical use, with common farmers, to enter into its composition chemically; though to those who turn to profitable account such inquiries, they are indeed highly beneficial. I leave all theories;—and wish to call the attention of the society to its practical uses. It would be very desirable to fall on means to acquire every information from those who can, from experience, give it; and multitudes of our fellow citizens have the capacity to afford the fullest

satisfaction, in every point of practice required. It is more necessary to excite the inclinations of many of them to communicate their practical knowledge, than it is to give them instruction; as this substance has, in many districts of our country, now become one applied in common course. It is annually becoming dearer to the farmers in old settlements; and especially in the vicinity of the city and large towns; owing to the demand of this material for buildings, and the scarcity of timber for fuel. From twelve to fourteen cords of wood are consumed, in burning one kiln of lime of six hundred bushels. The quarries are inexhaustible. No other fuel equals wood for this purpose; as we may see by comparison of ours with the lime of our coal countries where it is tinged and discoloured; and vitiated by the sulphur of the fossil coal used in its calcination. It would be on these accounts desirable to offer a premium, or, in some way, to encourage improvements in the construction of lime kilns; to save the consumption of fuel.* Coked coal might, where timber is exhausted, supply the place of wood.

* In our western country, *pit-coal*, and *limestone*, of the first quality, are generally, and in great plenty, found on the same spot, in strata of from four to six feet in depth, or thickness, respectively; above or under each other, as they happen to be naturally placed. Coal may be as easily *charred* or coked (and much in the same way) as wood burnt into charcoal. In that country, furnished with such abundant means in all quarters, *manufactures*, are rising, and may increase, with time and population, to an incalculable extent. Cheapness of produce will forward them. Domestic markets will be created,

The quantity, per acre, proper for soils of different textures is by no means fixed; either here or in Eu-

to stimulate and reward the labours of husbandry: and thus the inconveniencies of the distance from the ocean, will be amply compensated. Although wood (to preserve which they take no care) may be now in plenty, the coal will be in the greatest demand. Most of the heavy materials used in the Staffordshire *(English) potteries*, placed where they are principally on account of the coal for fuel in many parts of that coal country, are transported from a distance of 100 miles and upwards. Steam (in our western country) must be substituted for water powers, where the streams fail for several months in the year, beyond the western mountains.

I have had kilns of lime burnt on my Belmont farm, (which is on the tide water of the Schuylkill) from limestone brought down the river, through the great falls, in a boat carrying 12 to 15 tons. Enterprising persons might establish, on a large scale, some plan of this kind. The kilns might be erected on the tide waters; and wood, or sea coal, for fuel, brought thereto, at a small expence. A profitable business might be thus established. A sufficient stock of stone for the season, could be transported, while the upper waters were boatable. The city being supplied wholly or partially from these kilns with lime, the country would have it in greater plenty, for agricultural purposes.

It is to be much regretted, that the lower, or Norristown, canal scheme has been interrupted, or failed. I have no doubt, however, but that, at no distant period, this canal will be completed; or one will be carried on the western side of the Schuylkill; where I have been always of opinion (and so was the most intelligent hydraulic engineer we have had here) that it will be found to be the easiest, and least expensively practicable. *Marble*, *limestone*, *lime*, *soap-stone* (as well as

rope. I have been surprised, by what I have myself seen, and more by the accounts I have read in European books, at the great, and to us incredible, quantities of lime allowed by Europeans to an acre. Ours is the statute acre of 160 perches. The common computed acres of Europe differ in contents; so that it is difficult always to understand what is meant by writers, even in England, by the term *acre*. But the lime of Europe, applied in the quantity of 160 bushels to a statute acre of 160 perches, at one dressing, must either be of inferior strength and quality to ours; or there must be a vast difference in the effects of climate. As to soils of most countries, they are much alike. There is not, on our globe, better nor worse land, with all the intermediate gradations, than can be found here. It is composed of all the varieties of materials, generally found in soils of other countries; though no accurate analysis, of quantities and proportions of these materials, has been made. It would be highly useful, that geological explorations and inquiries should be more generally prosecuted throughout our

building stone) in inexhaustible plenty, could, by this means, be supplied; and delivered in the city for domestic purposes, or exportation.

Since this communication I am informed, that a plan for burning lime on the tide waters of the Schuylkill, is commenced. It has my sincere wishes for its success.

R. P.

30*th August*, 1810.

country. Every farmer should analyze his own soil;* that he may be the better enabled to cultivate to advan-

* There is an excellent treatise, "on the analysis of soils connected with their improvement," by the celebrated Professor *Davy*, chemical Professor to the British board of agriculture. This might be read with instruction by one versed in such subjects; and rendered more intelligible to practical farmers; though I think it sufficiently plain in the most necessary directions. Our extract from Lord Dundonald in vol. 1. is highly worthy attention, and can easily be practised upon.

The use of analyses of soils is very properly stated to be, for the purpose of enabling us to find and supply the defect of proportion in the primitive earths. Mr. *Davy* truly observes——

"In supplying animal or vegetable manure, a temporary food only is provided for plants, which is in all cases exhausted by means of a certain number of crops; but when a soil is rendered of the best possible constitution and texture, with regard to its earthy parts, its fertility may be considered as permanently established. It becomes capable of attracting a very large portion of vegetable nourishment from the atmosphere, and of producing its crops with comparatively little labour and expence."

It was to encourage our farmers and others in pursuits, having this object in view, that we offered our first premium, in 1806, for "ascertaining the component parts of arable land." This (and most others of our endeavours to promote a spirit of improvement) has been too little attended to.—While farmers are regretting the want of *dung*, *lime*, and other artificial supplies, they overlook materials for permanently fertilizing their fields, to be found on their own farms.

R. P.

tage, by knowing its texture, and applying the manure the most suitable to it. THREE HUNDRED BUSHELS *(Winchester)* of lime, have been, at one time, spread on an acre, in England! Half of that quantity, laid on at once here, would ruin any acre of land within my knowledge. I mean a worn acre taken up for amelioration and recovery. Land reduced to sterility, by bad farming and over-cropping, is like the stomach of an animal in a state of debility. It must be recovered by gentle means applied repeatedly, and at proper intervals. Too much food is as destructive to the animal, as over-liming is to the impoverished land; whatever may have been the original stamina of the one, or qualities of the other. It is essential to know what quantity per acre, is advantageous and proper *here;* and the most beneficial modes of using it. When I began, in the early part of my life, to lay on lime, I was advised that the lime would spend itself as much if no culture were carried on, as it would by the severest cropping. I soon found that limed lands required as much care and good management, as others. The lime may sink, or part with its qualities; but severe cropping and bad systems, injure limed, as much as other soils; and, I think, leave them in a state more difficult to recover. I have myself experienced this, when I overlimed or overfarmed, from want of proper information. I therefore suspect, that the lands said, in many places, to be *lime-sick*, must have been badly managed, and overworked. And yet in some parts of our country wherein they have discontinued the use of lime, after having long applied it (perhaps in too great quantities) there are good farmers. I believe land requires a change,

after a certain time, of manure as well as of crop; though either may be, after proper intervals and with suitable auxiliaries, again introduced with equal benefit. I do not know enough of facts, relating to *lime-sick* lands, to give an opinion: and this is one among other reasons, why I wish the society to promote inquiries.

I believe it is generally known and agreed, that the poorer the land, either naturally or by wearing, the less lime it will bear. So that 25 bushels will benefit, where 50 would injure. *Lime*, being in itself no manure, must find, in the earth, or in the air, something to act upon, or co-operate with. And, that it may have constant communication with the atmosphere, it should be kept near the surface; both in its first application, and by deepening the ploughings to bring it up when it sinks. I have made much use of it, in every way, and in great quantities, for a long course of years. My soil is various; but generally a kindly loam, mixed with *mica* (isinglass) and in parts sand, as well as clay. The surface is of every description, as to exposure, hill and vale. It had been much worn in some parts; and I have cleared off, from time to time, a considerable portion of the timber. So that I have had all kinds of soil to operate upon. I have generally begun with 40 bushels (sometimes 50, and often 30 and 35) to the acre. I prefer it to be laid in half bushel-heaps, and water-slaked. But I frequently cover these little heaps with earth, and leave it thus to slake; closing the cracks carefully, as they appear. Sometimes I leave it through the winter, in large heaps of 40 or 50 bushels (accordingly as I determine the quantity per acre) well protected by earth and sod. I choose, when practicable,

to spread it in the autumn; and either plough or harrow it in. The next season I take only a summer crop. Indian corn I think the best; as its culture mixes the lime most effectually with the soil. I have most frequently put lime on in the spring; and I have cropped fields with winter-grain, when limed in the same season. I have sometimes succeeded with *rye;* but when *wheat* was sown on land fresh limed, I have invariably suffered by mildew, smut, rust, or blight. I scarcely remember an instance to the contrary. The crop is retarded in its maturation, by the lime: and though it shews a deep verdure, and large heads; the former is as deceptive as the blush of a hectic; and the latter seldom, or never fill.* Yet in some European books, I

* It would seem that the fresh lime, acting on the substances in the earth with ruinous energy, pressed on the plant more food than it could digest or contain; and produced death by a fatal *plethora*. With a good glass one can plainly discern the bursting of the vessels and the extravasation of the sap, with all their consequences. The grain is shrivelled, though the plant, until its catastrophe, appears to thrive. If winter crops on fresh limed lands come to maturity, they ripen late; and their risks of mildew are increased. I have observed this, even when dung is used with fresh lime. But with lime alone on exhausted lands, where little or no vegetable or animal matter is found in the soil, I have seen wheat a starved and worthless plant. Summer crops only should be sown on land fresh limed; and Indian corn is the most suitable. When I repeat the liming, as I have generally done with a greater quantity than that first applied, I commonly take a crop of Indian corn in the year before wheat; to *kill the lime*, according to the country phrase. The corn, being

see it recommended, to plough or harrow in the grain and lime together. I have never approved of dunging the ground at the time of liming; having made comparative experiments. My course has been, to lime,—take a summer crop,—fall-plough,—and, the next year, an open fallow, or a covering, but inexhausting, spring-crop, preparatory to dunging for wheat. In this course I have invariably had success; and therefore prefer it to any other. I have, when the field came in course again (in three or four years) limed; and thus repeated the applications to 120, and in one field, to 160 bushels to the acre; including all repetitions of liming, at different, and distant, periods. I have known 80 bushels to the acre (put on, at once, on such land as mine) in-

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a gigantic plant requiring large supplies, will thrive on all the food that lime can furnish or prepare.

When I began to lime (45 years ago) I had no practical instructor; for it was a novelty in my neighbourhood. I have lost whole fields of wheat on limed lands sown the first season of liming, in a few days after the deceptious verdure of the plant had induced me to count on a plentiful crop. The same fields produced clover in abundance. In their next turn for wheat (and especially if assisted by a light dunging) they amply retributed my former disappointment. My success was much increased after I used plaister on the clover crops; which ameliorated the soil, and furnished vegetable matter for the lime. A moderate liming, (say 30 to 40 bushels to the acre) harrowed in on fall ploughed ground, and laying exposed through the winter, will part with most of its caustic qualities, and do with dung the succeeding spring, or autumn. But it would be much better to intermit *wheat*, for another year.

jure the field for several years; or until recovered by dung, or green manures ploughed in. It is said that clay will bear the heaviest liming. So that climate, strength and quality of lime, (I mean stone-lime, as ours generally is) differ widely in this, from those of other countries.

Farmers of what are called *strong lands*, have told me, that eighty bushels per acre, on the first application, were but a moderate allowance. But I have ever believed that it would have been better to lay on forty or fifty bushels in the beginning; and increase, by repetitions, after proper intervals. Strong lands are precipitated into debility by over stimulation, as strong men, or other animals, are enfeebled by excess, or over exertion. Some of our strongest lands are now thus reduced to a situation to be no longer benefitted by lime. In lime-stone countries, where lime is obtained on easy terms, I have known it spread without rule, or attention to exact quantity. I always predicted, that repentance would, one day, follow when too late, this agricultural enormity.

In *Europe*, lime is heavily spread on a tough old grass lay; and it meliorates the grass, so as to render it highly palatable to cattle, and hastens their fatting. It lies thus, twelve months (having been put on in the autumn) and the field is then ploughed, and taken up for a course of crops; preparatory to being laid down again in grass. In this way, it is alleged, and it seems reasonable, that land will bear the heaviest liming; especially if it be a strong clay; though it is known to benefit lighter soils the most.

Lime on clay has never succeeded with me, to any profitable extent. The idea of its durably warming cold clayey land, is unfounded. Heat is disengaged, when water or moisture solidifies, while lime is slaking: but it becomes shortly thereafter, a cold substance.*

* Moss or a green fungus, such as is seen on damp north walls, stones, or on the butts of trees growing in cold soils, will be often found on the ridges of limed lands, in great plenty. I have considered this as a sign of coldness, rather than heat, in the lime. I have conceived that hot, dry, and light soils were benefitted and corrected, by the *cool* and binding quality of the lime; as well as by its attracting and retaining moisture; independent of its other qualities. Mosses are found in all kinds of land, and especially in wet and cold soils. I think they abound on limed lands, in by far the greatest quantities.

See Mr. *Lang's* observations on LIME—page 1; which are well worth attention. I unwillingly meddle with conjectures, however plausible they may seem; leaving them in better hands. It is known however, to every body, that *lime*, after parting with its fixed air, thirsts for its recovery. I therefore believe with Mr. *Lang* (page 7) that it preys on the plant, for lack of other supplies; and attracts all the carbonic acid it can obtain. And this is its process, rather than durably warming the land. Heat is not disengaged while it recovers its fixed air, as it is when it parts with it. *Dung* gives it the pabulum it wants, both for its caustic and attractive qualities;—so do vegetable substances found in the earth;—of which poor and exhausted land affords the fewest; and therefore will bear the least lime. This fact I know;—its theory I will not insist on;—lime certainly (especially when applied fresh) retards maturation; and exposes the wheat crop to injury, if not to ruin. I have repeatedly

Its particles are too small and fine to keep asunder those of the clay; and such things as produce this effect are the only proper auxiliaries for clay land. Gravel, sand, shells, unburnt limestone, are better than lime. In clay ridged and drained, and kept dry and friable, lime may be serviceable.

I have spread lime on a clover lay, and suffered it to remain on the surface, through a winter; then ploughed; and the lime being well incorporated by heavy drags or harrows, I have found it a very advantageous mode. I have always preferred, in this and every other mode of application, laying on the lime, and mixing it thoroughly with the soil by frequent stirrings, without dung. I have repeatedly observed, that fresh lime and stable manure, put on together, are by no means so efficacious, as when the latter is applied in the season succeeding the liming: green manures, with fresh lime,

found that dung, in equal quantities, put on the year of liming, is very inferior in profitable effects to that applied in the year succeeding the laying on the lime. In the contemporaneous application with lime, part of the dung is consumed, and goes to balance, or remedy, *an evil:* instead of wholly operating to effect a positive *good;* as it does when the lime, by losing its causticity and *predatory* qualities, is prepared to co-operate with the dung, in the salutary and beneficial purposes intended by their combined application.

The lime, when it has spent its noxious activity, operates as a mild solvent. It attracts, and, elaborates the acids in the dung, and the vegetable or other substances in the earth; and prepares them to enter the plant, and to become its food and essential nourishment.

R. P.

do better. Lime, like salt, in very *small quantities* is *septic*, and may with dung be useful: but in the quantities usually applied, it must be injurious, on chemical principles, and in fact, to both the land and dung; which latter *flatters* in its effect on the crop, compared to one with lime alone; as dung will always shew itself in a greater or less degree; but it will shew and act most effectually, when it is not neutralized or consumed by fresh lime.

The varieties of our lime, as to strength or composition, for either masonry or agricultural uses, have been very little attended to. It would be important that some simple test or trial of the qualities of lime, should be established and promulgated. I know that there is in practical result, a great difference in the effects of equal quantities in bulk, measured, or weighed; and the lightest is commonly the best. This I supposed was owing to its being better burnt; so as to have less core. It is but recently, that this subject has been, in Europe, minutely examined. Some kinds of lime have been found, *there*, so composed, as to be prejudicial to agricultural operations. *Here* lime differs widely in effects, on land or crops; so as to require greater quantities of one kind, than of another. I have found it so, in mortar.*

* In a conversation with Mr. *Lang*, I found that he had, very meritoriously and usefully, continued his investigations on the analyses of the lime of this country. He believes that the greater part of ours is the *magnesian* lime; and that it is not attended with those deleterious effects attributed, by

It will be perceived, that I have avoided, (as much as possible,) technical disquisition. If I have not men-

English writers, to lime mixed with *magnesia*. If some patriotic chemists would assist us in analyzing lime from every quarter of our country, great advantages would be derived to agriculture. We volunteer our services; and so must chemists. Our limestone is of great varieties of texture, colour and composition.

Without knowing the composition of the lime which gave rise to my observations in the text, which are grounded on facts within my own knowledge, I am now satisfied that where the greater quantities were required, the lime was *mild lime*. I remember since Mr. *Lang* mentioned the subject, many instances where the lime soon exhausted all its powers. And I have always found that small quantities of strong, (or according to Mr. *Lang's* ideas, *magnesian*) lime were more serviceable and much more durable, than larger quantities of that which must have been of the mild species. From one lime-burner I always had what I called *weak* lime; and discontinued dealing with him. The discovery of the component parts of our lime generally, would diminish the surprise I always feel when I read or hear of the vast quantities applied to land in Europe; and it would, account for the small quantity of *our* lime, proper for *our* land. The Europeans must use what is called *mild* lime; and we the strong or magnesian kind. Their lime cannot be many degrees stronger than *chalk;* which also being a species of lime, contains the cretaceous or carbonic acid. Should our investigations of lime, proved by practical tests, turn out as now supposed, we shall correct another European error, on the subject of lime. It was long believed in England, that lime and gypsum were hostile. Yet they knew that the gyps is itself a sulphate of lime; and therefore that it ought to have appeared reason-

tioned any thing new to experienced farmers, or others acquainted with the subject, I have, at least, endeavoured to set an example; so as to invite their communicating what they know to be instructive. Putting a subject *in requisition*, always rouses attention; and draws forth useful facts; and discussion conveying instruction, which would otherwise remain hidden, or confined to the knowledge of a few individuals. What may be familiar to experienced agriculturists, is nevertheless highly acceptable, and essentially instructive, to those who want practical knowledge.

RICHARD PETERS.

2*d July* 1810.

To the Philadelphia Society for promoting Agriculture.

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able, as we find it in fact, that there is no hostility. It is most probable, that the sulphuric acid of the gyps, being the strongest, while the carbonic is the weakest, expels it,—sets it free to act on the plant,—and repels farther supplies of fixed air taking possession of the lime.

As to the point—whether the lime we commonly use is or is not of the magnesian species, it yet depends on more extensive examinations than have, in this early stage of inquiry, been made, before a decisive opinion can be formed. So far as the experiment Mr. *Lang* mentions reaches, the proof appears strong. And if specimens of the limestone in other quarters produce, when analyzed, the like results, the point will be indisputably decided.

R. P.

September 17*th*, 1810.

See hereafter Mr. Lang's communication.

Elkton, June 24*th*, 1810.

Read August 14th, 1810.

Gentlemen,

A few years ago, I informed you of a distemper in my wheat, which I call a decay in the root, others call it sedge wheat. This malady continues with an increasing spread.

From information that on land where the red chaff had been destroyed, the white wheat would succeed, by sowing it the next rotation of crops.

Last fall I tried the experiment, on about two acres, in a field that had been destroyed three years ago, by sowing part of the land that had been affected with red chaff and part with white wheat. The red chaff languid: white recovering.

From about the 15th of March to the middle of May, the whole appeared nearly dead, or what is generally called sedge wheat. At present the white wheat is making considerable progress; and if it ripens clear of rust, may be half a crop, while the red chaff, dont seem to recover. As there must be a cause for effects, my hypothesis, or reasoning on this subject is, that it is well known that the red chaff bearded wheat, dont stool or throw up as many stalks from the root, as other wheat, it requires more seed to produce a crop equally thick, of course, may not put out as many side roots, but depends more on the main tap root for nourishment.

The tap root being injured, prevents its recovering, as other wheats do. This may be the cause of the red

chaff, being injured by this pernicious insect, more than other wheat. Hoping some abler hand may make farther discoveries, on this pernicious insect. It appears all sorts of wheat are exactly alike, but the bearded dont recover as other wheats do. Rye is proof against it.

Your most humble servant,

Z. HOLLINGSWORTH.*

To the Philad. Agric. Society.

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* Conceiving then, as I now do, that the malady in the wheat was occasioned by insects; soon after Mr. *Hollingsworth's* information to the society. (See our first volume 124, 5.) I wrote to him, suggesting some experiments for the destruction of these very pernicious vermin, of which we have no complete entomological description. I proposed that, on a small scale, every endeavour should be made to find out the means of their destruction. But I see not that any thing has been attempted; and therefore conclude that my suggestions were deemed unimportant.

1. The best remedy would be to discontinue, by general consent of a neighbourhood infested with the worm, or insect, the culture, of wheat. It may be an indication of nature, that a change of crops is indispensable. And they may as well do willingly, that to which necessity will compel.

2. I proposed fall, or winter, ploughing; and frequent winter harrowing; to expose the worm, or larvæ of the insect, to the severity of frosts.

3. To lime lands infested; and to spread salt (Marine) plaister of Paris, or any other substance known to destroy insects or worms.

4. To try experiments on the living worm, or insect, be it a moth, beetle, fly, or in whatsoever shape the enemy may,

in any stage of its existence, be found; to discover what will kill, or banish it. The change of one species of wheat for another, does not seem effectually to answer the purpose. I have thrown in my mite towards the relief of those who suffer; let other members of the society contribute their assistance. The ravages of those insects are not abated; and may spread to places, wherein their appearance is the least expected. The *Hessian fly* began its desolating march, at a great distance from us: but its progress, though slow, brought a scourge, which will never cease to chastise us. It compels us, however, into good husbandry: as the only means of resisting it. The southern "*decay of the root*," most certainly owing to insects, may oblige the farmers afflicted with this misfortune, to banish many bad habits, such as sowing wheat among Indian corn, and labouring over a vast surface, for very little proportionate profit, &c. It appears by the papers published in the pages following Mr. Hollingsworth's former letter, that I am not singular in my opinion of the cause of the misfortune he complains of. Its appearing the most "*where land is manured with scrapings about doors, or where old buildings, fodder-houses, stacks of hay*" have been; is, to me, a decided proof, that insects, bred in such nurseries for them, are the enemies to be subdued. If manure, from the places described, must be used, let it (and the earth which had been the site of buildings, fodder-houses, stacks, &c.) be composted; and mixed with lime, salt, or plaister; as advised in our former volume. Mere change of one wheat for another, will not eventually cure the evil. Nothing likely to succeed should be left untried. Those who have access to them, might (as is done on the sea shores of New-Jersey) spread the hay, grass or sedge of salt marshes, sea weeds, or even salt water. These are hostile to worms or insects; and are in themselves powerful manures. See vol. 1, pages 171, 2, 322.

R. PETERS.

Deterioration of Grain.

Read August, 14th, 1810.

Permit me to mention what with me, has always borne some analogy to my experience, with respect to animals kept long on the same farm. I mention, in our 1 vol. pages 214, 15. the *Mandane corn.* I had it, for two seasons, on my table in perfection on the 4th and 5th, days of July. It is now a large, though at first, a dwarf plant. It is just setting to ear, and not so forward as other early corn. I pursued, in every particular, Mr. *Cooper's* directions, as to my seed and planting distant from other corn. But it turns out exactly as I predicted, page 215. "This corn will, in a course of time, change its nature, and assimilate with our own. I never had any seed that did not change, with all the care I could take." Mr. *Cooper* has great luck, as well as great judgment, in his more successful practice. I am mortified under the truth of my prediction; though such mortifications are not new to me. This change in my corn has occurred sooner than usual in such cases.

Mr. *George Bickham* informs me, that he had the same kind of corn fit for the table in June. He brought a few grains from the southward, and planted them last year. His time for change is not yet come. The distance from whence the seed came (and possibly a change of soil) has favoured him.

RICHARD PETERS.

16*th July*, 1810.

To the Philad. Soc. for promoting Agriculture.

Advantages of Agricultural Tours. On Gleditsia Triacanthos, or Honey Locust, Hedges. By Wm. Rawle.

Read August 14th, 1810.

My dear Sir,

I wish I could contribute to the stock of the society any thing deserving its notice. Mere theories are of little use to the public. Facts accurately described and well established ought to be laid in, before the work of the theorist commences. For these we must, in general, depend on a class of men, who, though liberal in colloquial communications, are often unwilling to take up the pen. The practical farmer, kind and hospitable to his guest, delights to make his own experience and labours the subject of conversation; but the mind unaccustomed to literary composition, is as averse to throw the same information on paper, as the hand, rendered rigid by daily employment, is often disinclined to the mechanical operation of the pen. The alternative is *to go to them*, for what they will not *bring to us.* Much useful knowledge might be collected, and many new and striking matters of fact made public, if agricultural tours, so common in England, were sometimes made here, with a view to publication. An intelligent man who would first begin with our own state, on the more important and *best*, and perhaps also, (as a contrast) the *worst* cultivated part of it; who would visit the farmer at his homestead, closely examine his practice, hear his narratives and his reasonings, look into every thing, both in gross and in detail, and carefully note down,

on the spot, without trusting to subsequent recollection, what was worthy of public communication, would confer (not an incalculable) but a calculable benefit on the public. One section of the country would then learn the actual profit or loss of modes of husbandry pursued in another; perhaps possessing the same soil and climate, but deriving a greater or less advantage from them, in consequence of variations in their modes of husbandry. It would discover its own errors, or increase its own improvements, as the case might be, by comparison with others.—The publications of such tours, particularly under the sanction of a respectable society, would widely and promptly disseminate this useful knowledge. Is it not surprising, that with the example so long before us, of a nation whose language we use almost exclusively, and whose literature is the chief reliance of our booksellers and printers, and from whom we import so regularly every publication that appears, and, among others, the various tours, not only through Great Britain and Ireland, but parts of the continent, that we should not in a single instance, that I know of, have had a similar exertion made? I except indeed some of those "*notices*" of our agriculture, which a few hasty and prejudiced foreign travellers have inserted in their works. Men who have allowed too short a space of time, even for the secondary importance, in which this subject presented itself to them. Men, who have formed their theories before they began their travels; and, inclined beforehand to depreciate the progress of art in these new countries, are too blind to perceive, or too uncandid to confess, that art has already made a considerable progress among us;

and, with proper assistance, might perhaps (to speak modestly) in time equal the improvements of our elder brethren. If the rest of the world possessed no other account of the agriculture of England, than what has been observed and published by foreign travellers among them, our information would be imperfect indeed.—It is wonderful that the benefits of the press, that rapid, cheap, and easy mode of communication, which brings distant nations to each other, and familiarizes one half of the globe with the daily events and domestic transactions of the other, should have been neglected by ourselves on this important subject. Slow, imperfect, and uncertain, as verbal communication is, it is as yet almost the only means of information; and while we know distinctly and fully, by taking up a book, the course of husbandry in Norfolk, Sussex, and Lancashire, we cannot I believe, beyond a few scattered instances, find a single printed memorial of the course of husbandry of a state in the union. Like our tawney predecessors, we must depend on "the tales of our old men," or the accidental arrival of an inhabitant from the place, before we can acquire the knowledge we want. This is withholding the facility acquired by the art of printing, from that art; which, as it is the most necessary, must be admitted to be the most important to man.

Let me then venture to suggest, that as soon as a sufficient fund can be raised, and a suitable person found, an agricultural tour should be set on foot under directions of the society; beginning in one of these counties, such as Lancaster or Berks, in which the operations of agriculture have hitherto been carried on with

the most spirit and success. The particular objects of inquiry to be given to him in charge by the society; without precluding him from collateral pursuits of the same nature, particularly mineral productions and statistical details, connected with the leading object.

Such a survey, when carefully taken of one county or district, with the closest attention to accuracy, would not only facilitate similar undertakings among ourselves, and possibly (as in the case of *Arthur Young*) at private expence; but excite a similar spirit in the other states. I consider the utmost accuracy an inseparable ingredient in the utility and success of the plan. The detection of an error, even of little importance, would excite doubts as to the rest of the work; and diminish its popularity in the neighbourhood to which the error related.

From this general subject let me now proceed to a particular one, on which the society has very justly bestowed a portion of its attention.

A cheap and certain substitute for the expensive fences, in use among us is truly desirable.

The pleasing and benevolent St. *Pierre*, comparing architecture with planting, observes, that the moment the building is finished it begins to decay; while the plant as soon as it is left, begins to improve, increase, and reward the hand that set it in the ground. I have not the book with me and am not sure that I quote correctly. The thought, however, is as I state it; and nothing can be more beautifully just; nor more applicable to the difference between a live fence and a dead one. But there is certainly some great impediment in the way of raising good hedges with us. In very few parts

of the country do we see it attempted; and frequently, after several years toil, it has been abandoned as a hopeless, or at least unprofitable effort.

One of the great objects of an American farmer should be to compose his hedge entirely of an American plant.—Even if the *white thorn*, which may be imported from England, accorded better with our climate than from the experiments in the vicinity of Philadelphia, I am inclined to think it does, the difficulties and expence of importation form sufficient reasons to reject it.

I have on a small scale, made several experiments to raise a hedge, strong, handsome, and durable; my wish was to raise from seed sown on the spot. I tried in the first instance the berries of the common cedar, and the next year the berries of the juniper, after finding that neither of them germinated, though the ground was well prepared, and care taken to keep it clear of weeds. I made another attempt with the cedar berries; endeavoring to prepare them by a treatment assimilated to the process which takes place in the stomach of birds; who are known to be the great propagators of these plants.—That is, I soaked them, for four or five hours, in warm water; then putting them with sand in a bag, had it well shook, rubbed, and rolled for some time, and immediately put the berries in the ground. Of this I tried a furrow of a few yards only by way of experiment, but was equally unsuccessful. I tried (by advice) the pomace of a cyder-mill in the autumn; but I suspect the field mice, with which my place abounds, defeated me in this case. The cuttings of the privet succeeded; but the privet forms rather a screen, than a

hedge; and I wished to find something capable of turning back the horned cattle, which I have generally observed require a stronger hedge than horses. After some consideration I concluded to try the seeds of the honey locust, *(Gleditsia Triacanthos)* and of these in the autumn of 1803 I procured a quantity from Richmond point, near Philadelphia. The object was to secure them, when put in the ground, from my clandestine little enemy, the field mouse; and supposing the smell of sulphur to be obnoxious to it, I steeped the whole of the seed, 24 hours in water, with pulverized brimstone. The ground was the edge of a garden, loose and tolerably rich. The seed was sown in three rows; on the first of April 1804. The young plants soon made their appearance; and I believe not a seed was lost. I took no other care of them than occasionally to weed them; but the next spring, conceiving that I could spare one row, I reduced the number to two; by transplanting to another field. The plants thus removed throve exceedingly well; though not equal to those which were left behind. I regretted this removal; however, the following spring, when I found many of the original plants did not put out leaves, and on examination I discovered that they had been destroyed by the indefatigable mice, by gnawing the roots under ground, so that the dead plant came up with a slight pull destitute of roots. Fortunately this had not been so general as entirely to defeat my plan; and in the ensuing autumn I replaced some of the destroyed stocks; and conceiving that the dead grass and accumulated rubbish, along the bottom of the hedge, had allured the mice, by affording them a warm cover, I had it all

cleared away:—dug a small trench on each side of the hedge, and inserted gravel and sand in them.—No injury has since been done to the hedge.—It has continued to thrive,—is annually headed down,—presents a beautiful foliage to the eye, and, except in one place where too wide an aperture has been injudiciously left, is without any artificial aid an effectual bar to cattle.—Its length is 260 feet.

This plant though it passes under the general name of *locust*, is a distinct thing from the *robinia;* which is the common locust; and of which there are several varieties. I have four of the latter on my place, none of which would answer for a hedge.—The *robinia pseudo acacia*, and the *robinia glutinosa*, (brought by *Michaux* from the westward) both of which are liable to be perforated by insects; the thornless robinia, which I believe is not a native, and the *robinia hispida*, often called the *rose acaua*, which is merely an ornament for the shrubbery.

In the subjects for premiums the white mulberry is mentioned. I tried this plant in 1794 at another place; but found its growth too slow and desultory, to render it valuable in this point of view.

There are two other strong objections to it, the want of thorns, and the fondness of cattle to browse on it. The plant selected for this purpose should either be obnoxious to the taste, or defended by thorns; its growth should be compact and steady; it should bear the shade, and drippings of trees, which we sometimes, for different reasons, are desirous of retaining in the line of a hedge or near to it. This property is not always

to be found in plants but the *gleditsia* will grow cheerfully in the most confined situation; and does not throw out suckers like the robinia.

I am my dear Sir,

Faithfully and affectionately yours

W. Rawle.

Harleigh, July 31*st*, 1810.

Hon. Richard Peters.

President of the Agric. Soc. Philad.

Philadelphia, July 12*th*, 1810.

Read August 14th, 1810.

Sir,

I conceive it a duty I owe the society, to communicate through you, the result of some experiments which I had set about, for the purpose of ascertaining the best means of reclaiming old worn out land. I had fondly listened to the method proposed by some, of improving, with clover and plaister, without the use of lime; and determined to try it. The field which I pitched upon for my experiments contains about fourteen acres; it had been cleared about fifty-three or four years ago, and continued in constant cultivation for upwards of thirty years, without manure of any kind. Some old people now living, say that they have seen as good crops of wheat cut from it, as ever they saw; but it was kept in cultivation till the produce would no longer pay for the labour, and has been thrown out a common for more than twenty years, 'till I fenced it in. I had the whole of the field ploughed early in the spring of 1808, in the month of May one part of it was ploughed again, and sown with buckwheat; this buckwheat was ploughed in when in blossom, and the land sown with buckwheat a second time, which was likewise ploughed in and sowed with rye.

The other part of the field was limed, at the rate of 25 bushels to the acre, and planted with corn. The lime which I used was of the hot kind, from a quarry which is generally approved of for land in those parts; makes

very strong mortar for building, but is not used for plaistering, being granulated and not very white. I suppose it to be similar to that described by Dr. Darwin, which he supposes to have been primitive lime, broken down by the action of water and petrified a second time, which he thinks is the strongest lime.

The following summer was very dry, which together with the heat of the lime, I supposed to be the cause why the corn became stunted and produced almost nothing. In the spring of 1809, the land was ploughed and sowed with oats and clover, the other part of the field which was now in rye, was likewise sowed with clover at the same time, and as soon as the clover began to appear above ground, the whole field was sowed with plaister.

At harvest the oats was a very good crop, the rye was tall and well eared, but rather thin; perhaps it was owing to this circumstance, that the clover among the rye looked better, and more plentiful than that among the oats. I had not seen it, until Wednesday the 4th instant, when I found that part of the field which had been limed, closely covered with fine clover, whereas on that part which was not limed, almost the whole of it had perished last winter, and what plants remained were weak and sickly, and abundance of wood-grass beginning to appear, with which the field used to be almost covered while it lay a common; whereas not one plant of it is to be seen on that part which was limed. From this I concluded, that if the system of improving with clover and plaister without lime, should succeed in the end, it must be by a number of repetitions of the same process, which would require time and labour

equal to if not exceeding the expence of lime, and the result uncertain. I therefore ordered that the part of the field which had not been previously limed, should be limed as soon as possible, twice ploughed, and sown with rye, and clover next spring.

It was the opinion of the man who farms for me, as well as of others who made observations, that I missed it by planting corn with the lime; that if I had sown oats and clover the first spring, I would have had a profitable crop, besides gaining a year in my improvement, which was lost by the failure of the corn crop, and part of the strength of the lime exhausted to no purpose.* I am fully aware of the objection which some have to oats as an exhausting crop, and therefore ill calculated for advancing the improvement of worn out lands. At the same time that I disapprove of the ab-

* However corn may succeed upon fresh limed land, in cases where the land was in good heart previous to the application of the lime; I here give my opinion not from conjecture, but experience and observation, that in general it will be found better for the land, and more profitable for the farmer, to defer either corn or wheat, until clover have first intervened; especially if the lime was of the magnesian kind, and the land poor; and then the addition of a little dung will be very useful. And in this opinion I am partly born out, by that able and experienced farmer Judge Peters, President of this Society; in a note at the bottom of page 280, of this volume, he has these words, "The same fields (where wheat had failed) produced clover in abundance. In their next turn for wheat (and especially if assisted with a light dunging) they amply retributed my former disappointment."

surd practice of some farmers, of sowing oats and buck-wheat, year after year, as the worst of all rotations; I am convinced from long experience, that an occasional crop of oats is no more exhausting than wheat, rye, or corn; that it is an excellent nurse for clover, a profitable crop for the farmer, and the straw good fodder or litter, without which he cannot get much dung, the value of which is not sufficiently appreciated by many of our farmers. Every kind of grain which ripens its seed is an exhauster, even clover which is the most ameliorating crop which we know, if it is but a moderate crop and left standing until its seed is full ripe, instead of improving, will be found to exhaust the land.

Before I conclude I must take some notice of the mild lime, which I mentioned in a note at the bottom of page 8. I then supposed the mild lime above mentioned, to be the property of Mr. Barnitt of Marlborough township, but when I was with my friend Mr. John Mill's on the 4th instant, he told me that Mr. Barnitt's lime is the hottest and strongest lime in that neighbourhood, that the mild lime which I alluded to is the property of Mr. Baker of Newlin township. The two limes are not more than two or at most three miles apart, Mr. Mills's farm lays nearly in the centre between the two, and he occasionally uses both. He says that it requires 130 bushels of the mild lime, to go as far on land as 100 bushels of the hot lime;* that the

* This last brings a higher price than any limes in that neighbourhood, or from the valley; being esteemed so much more valuable, as it goes farther on land &c. than either of these.

mild lime is in its effects on land somewhat similar to that of dung, as it gives out its strength to the first crop, but in one or two crops more it is all gone; whereas though the hot lime sometimes, instead of helping, rather injures the first crop, its good effects continue for many years. He showed me a clover field, one part of which had been manured with Mr. Barnitt's hot lime, and the other with Mr. Baker's mild lime. I observed that wherever a heap of the hot lime had lain, not a blade of vegetation of any kind had appeared, though Mr. Mill's told me that every particle of it was shoveled off as clean as possible; but on that part of the field where the mild lime was put, no such effects were produced. He told me further, that the grain was best on that part where the mild lime was put, but the clover is greatly superior on the other part, (it was all plaistered alike) and I have no doubt that the succeeding crops will evince a decided preference, in favour of the hot lime. I expect to procure specimens of both the above limes, for the purpose of having them analyzed.*

I am sir, yours respectfully,

J. LANG.

DR. JAMES MEASE.

* Having procured specimens of the above varieties of limestone, and by the polite attention of Mr. James Cutbush, have been favoured with a chemical analysis of each of them, (for the results of which see the letter annexed) we are enabled to judge of the striking similarity, between these and the specimens which were analyzed in England by Mr. Ten-

nent some years ago, as particularly noticed in the London Philosophical Transactions, and in the writings of Mr. Henry, Dr. Darwin and others.

We may remark that while the learned theorists in England and elsewhere, were exulting over the grand discovery, whereby the farmer might proceed with certainty in his choice of the lime most proper for manure, as if none but the mild or calcarious kind, would henceforth be used for that purpose. In the mean time, we find the great mass of practical farmers, whose practice is generally the result of long experience and observation, who read very little, many of whom seldom or never see a newspaper, far less the London Philosophical Transactions; who never heard of Mr. Henry nor Darwin's Phytologia; who are entirely ignorant of the grand discovery of the calcarious and magnesian limes, still giving the preferance to the hot or magnesian lime, and paying a higher price for it, even where the mild kind is equally within their reach, notwithstanding they know as well as Mr. Tennent, that the spots where the heaps of it had lain will remain barren for at least two years to come; they being at the same time sensible that with a judicious rotation it will produce them improved crops for a number of years, whereas the beneficial effects of the mild lime will be all gone in two years.

J. L.

Analysis of American Limestone. By J. Cutbush, Chemist and Apothecary.

Philadelphia, 13th September, 1810.

Sir,

I have made the necessary examination of the limestones you wished me to analyze. The comparative quality, with respect to the ingredients of each kind (hard white, and black micaceous) we may, therefore, the more readily judge of.

While one variety, on the one hand, according to my experiments, corresponds to that mentioned by Mr. Tennant; the other appears on the contrary, to be composed of more calcareous earth, and I presume would answer all the desirable purposes of agriculture.*

With respect to the limestone, when it comes under the head of magnesian limestone, agreeably to the name of Mr. Tennant, I would merely remark, that when the magnesian earth exceeds a certain *per centum*, it might, with strict propriety be referred to this class; for in most of the varieties of limestone, the magnesian earth is more or less abundant.

* Mr. Cutbush in this instance falls too hastily in with Mr. Tennant's hypothesis, in giving the preferance to the calcarious lime, for agricultural purposes. Whereas it is a fact well known, that Mr. Barnett's lime above noticed, (which agrees with Mr. Tennant's magnesian kind) fetches a higher price than any other limes in these parts; and such is the demand for it, that it cannot be got burnt fast enough.—When it is known that a kiln is ready, the waggons come the night before it is opened, and next morning they never stop loading until the whole is finished. This is sold at fifteen cents per bushel at the kiln, while the others are bought for twelve and an half cents per bushel. J. L.

Oxalate of potash, added in a similar manner, also produced a precipitate.

The last experiment decided the presence of lime, and the former in a great measure, the existence of magnesia. To ascertain this fact, however, with more certainty, a portion of the solution was examined with carbonate of ammonia, and the precipitate formed, was separated. The filtered liquor was now examined with phosphate of soda, which occasioned a copious precipitate. The quantity of this appeared to equal the quantity obtained by oxalate of potash in the former experiment, or that caused by the carbonate of ammonia immediately preceding. On examining the precipitate formed by carbonate of ammonia with muriatic acid and oxalate of potash, the whole was discovered to be carbonate of lime.

The phosphated soda, according to Dr. Wollaston, added after the carbonate of ammonia, in the manner of which I have spoken, (when the carbonate is used in the common temperature of the atmosphere) is the most accurate test for the discovery of magnesia.

The experiment for determining the presence of magnesia was made in a general way, in fact, merely to ascertain if this earth existed under the circumstances we have already stated.

The other specimen of limestone, which is far more friable, and of a dark micaceous appearance, was soluble with more facility in muriatic acid. The solution was soon effected; the addition of carbonate of ammonia separated the lime in an abundant precipitate; and the filtered liquor, after adding the carbonate, gave a slight

precipitate with phosphate of soda. Magnesia, however, as already stated is always found, more or less, accompanying lime.

With much respect, Sir,

I remain yours, &c.

JAMES CUTBUSH.

JOHN LANG.

Course of Crops.

Advantage is taken, of the vacant space in this sheet, by the writer of the note, page 144, on General Armstrong's letter relative to the *Draveil* plough and the *tenant's course of crops*, page 145, to correct an error. The words "*and his course of crops*," should have been omitted. There cannot be a worse course than *wheat*, *rye* and *oats*, immediately succeeding each other.

Monsieur Thouin's Letter, sent with a Box of Seeds.

The following translation of a letter from Professor *Thouin* is published in acknowledgement of his highly beneficial civilities. Nothing can promote mutual benefits to distant countries, more than such interchanges. We entertain a hope, that, not only the members of the society, but other citizens, will enable us to reciprocate such favourable attentions. These seeds and all others so received, have been, and will be, diffused for general benefit. An unfortunate delay, not owing to any want of attention in Mons. *Thouin*, prevented its arrival here for a great length of time, after its being sent from Paris. A sense of the importance to our country, of such valuable additions to our products, should stimulate our fellow citizens abroad, to exertion in forwarding their transportation.

"MUSEUM OF NATURAL HISTORY.

Paris 20th February, 1808.

"Professor THOUIN, one of the administrators of the museum of natural history at Paris, and member of the national institute of France, has the honour to present this collection of seeds to the society of rural economy of Philadelphia. He prays them to receive it as a pledge of his respectful attachment, and of his desire to concur with them, as much as lays in his power, to increase the agricultural resources of a people, whose wise laws he admires, whose freedom he esteems, whose independence he regards, and whose manners he respects.

"This assortment is composed of almost *four hundred* little packets of seeds of trees, and plants; exotics in North America, and which may be accommodated to every department of rural and domestic economy. The packets of the greatest part of the several species being in duplicate, contain a sufficient quantity of seeds to be capable of diffusion among a great number of the members of the society, who will cultivate them in various soils, different situations, and by many modes of culture; and thereby multiply the chances of success. In this way more certain results will be afforded, than if the whole were sown in the same kind of soil, in one place, and in one mode of cultivation.

"If the collection now sent is agreeable to the society, or to any of its members, and they desire to receive one similar, they have only to communicate to me their requests; and they will find me always disposed to procure for them every thing I have at my disposal, in the extensive establishment committed to my care. The society will acquit itself with interest, by transmitting, described or not, some seeds of the vegetable products which grow between the Allegheny mountains and the South Sea, in the countries which American travellers begin to frequent."

Respectfully,

THOUIN."

The following is published as promising much benefit in small operations. It will be highly useful, for selecting fruit, and detaching the nests of caterpillars from the trees, also in cutting off grafts and superfluous shoots. We are informed that instruments, on the same principles, exist in Germany, on a very large scale. We have conversed with an old Hannoverian gardener, who alleges he has seen and used one. This does not lessen the merits of the inventor; who, as has happened in other instances, struck out the same thought in a distant country.

Directions for the Purchaser of Jocelin's Patent Pruning-Shears.

In the first place. Procure a spruce, or other light and strong pole, planed straight to the size of one inch in diameter at the upper, and one inch and a quarter at the lower extremity, when about twelve feet in length and for twelve inch arm shears of about two pounds weight, and less when shorter poles, or for lighter shears:—burn in the spike end of the shears, after boring the pole, as a file into its handle, then drive on an iron ferrule; place the cord—draw it straight on the pole, and insert three or four wire staples, from a little below the shears, down to about half way, for the cord to run in.

In pruning, let the upper blade of the shears rest against a bud or twig, at the right hand; and by pulling the cord, the moveable blade is pressed against the

branch to be taken off, in an oblique direction; and having an acute edge, the cutting is mostly upwards, and easily performed on live branches, three quarters of an inch in diameter, more or less according to the size of the shears and quality of the wood—the distance of 20 feet above the place of standing, more or less according to the length of the pole. Poles of different lengths can be applied to the same shears, as occasion may require.

Let the blades be screwed as close together as may be consistent with moving freely—keep the principal cutting edge in good order, and the friction parts well oiled, and wipe the blades after using; observing to hook the arms together to save fingers.

The *pruning shears* are used to great advantage, in trimming young fruit trees by timely taking off, or shortening such branches as may be necessary for the health and beauty of the trees, and perfection of the fruit. For taking selected fruit cutting away worm nests, trimming goosberry and other shrubs, it excels.

Price single without pole or cord.

Twelve inch moveable arm,		Five dollars.
Nine inch	do.	Four dollars and fifty cents.
Six inch	do.	Three dollars and fifty cents.
Four inch	do.	Three dollars.

All persons are cautioned against purchasing any of said shears without a card, containing a bill of sale in due form—specifying the size and price of the shears so purchased, and signed by the seller.

And also permission for using the same, signed by the patentee,

SIMEON JOCELIN.

New Haven March 27th, 1810.
Honorable Richard Peters Esq.
Bought of S. Jocelin.
One of JOCELIN'S, *nine inch patent* PRUNING SHEARS,
Price 4 Dollars 50 Cents,
Received Payment,
Simeon Jocelin.

The Proprietor of my patent Pruning Shears, purchased as above stated, is entitled to the use of the same in his or her service only.

SIMEON JOCELIN, *Patentee.*

On Soiling Cattle, on Broom Corn, and Guinea Corn as Green Food for Cattle. By John Lorain.

Read, November 13th, 1810.

Sir,

On the 20th ultimo I topped one row of corn to ascertain how it would bear early cutting, and on the 31st commenced feeding my cattle with them, and they continue to eat every particle with greater avidity than any other food; and I think thrive faster than on first crop grass: the blades will be given in succession, the husks and stalks will remain to be appropriated hereafter: the former are relished by cattle more than any other part of the fodder; the latter weighs rather more than all the rest of the plant, and to reduce them to good food would be an object of no small consideration. In the winter of 1808, my cattle eat all the stalks I had, after cutting them from two to three inches; but then their other provender was bad, and in 1809 when better provision was made for them, they refused the stalks cut in the same way although they were better saved; this induced me to give over further trial till I could fall on some better mode of preserving them with a larger share of their juices, by cutting or in some other way reducing them much finer without too much expense.

In your Encyclopædia you mention some gentleman who cut them very fine with a very powerful cutting box, how this could be effected by manual labour without costing too much I cannot conceive, I have bruised

them under a conical roller (an excellent cheap tool for threshing grain crops) but found them so tough and elastic, that I have been discouraged from sending a load to some tanners bark-mill, though that would be much more powerful, and perhaps somewhat similar to the best mode of bruising whins in Ireland. Wishing this fall to resume the experiment, in order to determine the full value of a good crop of corn, I beg the liberty of asking whether any thing in the course of your practice or reading has occurred, that would enable me to use them profitably as food for cattle.

As you appear highly interested in the success of soiling, it will no doubt give you pleasure to learn, that I have surmounted every difficulty in the practice of this summer, seven of my cattle have been sold since you saw them, and there are several more that I shall offer for sale in a few days, and to crown my success, fortune has thrown in my way an invaluable plant. On the 19th and 21st of May I planted a small patch of Guinea corn in clusters from eight to twelve inches a part, and on the 23d another with broom corn adjoining it; the first has been cut with the scythe twice, and the second cut yielded full one-third more than the first, though not so tall; this was in consequence of the great increase of suckers: it bids fair for a third crop unless too little heat, or an early frost should affect its growth. The other patch consisting of broom and Guinea, was not cut till about five feet high, the plants have suckered greatly, and no doubt will produce a plentiful second cut. My cattle were very fond of it, but the quantity was too small to form any opinion of its nutritive qualities, but those must be very considerable if the observations on this plant in your Encyclopædia are correct: the enclosed extract of a letter from Dr. C. Drayton Junr. accompanying the seed will cast a very considerable light on the subject which, after read please return. If I am not greatly mistaken, Guinea corn will produce more green fodder than any other annual plant that has been used for that purpose, either here or in England; and under this conviction I intend the ensuing spring, to commence with cutting for my cattle, half or perhaps the whole field designed for Indian corn the spring following, and that the plough and harrow shall immediately follow the scythe, till sown broadcast with Guinea corn, by which means I expect to obtain a large supply of green food coming in immediately after first crop grass is done, and vastly superior to the best second crop grass, with no other expense than seed and harrowing, and the sod will be better rotted than by fall ploughing. I regret that I did not try whether Indian corn would not bear repeated cuttings if commenced before its disposition to sucker, ceased. If you have never examined the broom or Guinea corn in the different stages of their growth, and their wonderful and profuse suckering after cutting with the scythe, you will I make no doubt be highly gratified in viewing my little patches, more especially as you design to soil cattle.—I am generally at home every day after 12 o'clock, and on Sunday al-

together, and if it suits your entire convenience shall be happy to see you, and am your

Respectful humble servant,

JOHN LORAIN.

DR. JAMES MEASE.

September 12th, 1810.

N. B. The first cut of the Guinea corn was from three to two and a half feet high, the second from two to two and a half feet.

Remarks on the Culture of the Guinea Corn or Holcus Spicatus, referred to in the foregoing paper.

This plant being useful for fodder as well as grain; some manage it thus:

Oats, they sow the first week in November in drills one foot apart. In moderate winters it is fit to be used as green fodder by the first week in February, at that time the leaves when extended may be 18 or 20 inches long from the earth, and then cut six or eight inches from the top. This may be repeated several times, and cut within eight or ten inches of the earth.

Guinea corn.—About the middle of March, remove entirely every other row of the oats, and sow the Guinea corn in drills very thin, 10 or 12 grains in the space of a foot. It being a tender plant, not bearing frost, it is thus sheltered by the oats.—In six weeks it is fit to cut, about six or eight inches from the top for fodder; then remove the oats wholly. Thus from the beginning of May, it may be cut every 12 or 14

days until frost. In June collect the blades together and cut them all off, one or two inches above the crown of the plant, indeed, if the plant be cut near to the ground it will sprout out repeatedly but not leaf so profusely though come to good seed. But this hitherto only relates to fodder, and the cutter will be regulated in his cutting, by seeing what part the creatures refuse from being too hard.

When seed is the object, then in these rows which are three feet asunder, the plants may be hoed off, leaving small clumps of six or eight stalks about four or five feet distant in quincunx order as it suckers much, it may be occasionally suckered on the common principle: and these plants are good fodder.

If the seed be sowed for a crop of seed, disregarding use as fodder, the rows may be four or five feet apart and the clumps as far apart in the rows; sowing 10 or 12 seed, in each clump or hillock. If the soil be in good heart, it will probably not require a single hoeing; the plants stole so much, and abounding with leaves, the earth is almost entirely shaded, and in the more advanced stage, entirely so.

Like plants in general, it delights in a soil rich, dry and loose. In the West Indies it yields two crops annually—both yielding from 60 to 80 bushels of seed. Here* we set but one crop. In the field, the birds are fond of the grain; and in the barn, the rats. It is excellent for poultry, and where the seed is cleared from its husk, by beating in a mortar; and boiled and eaten

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* In Carolina.

with butter or milk it is scarcely to be distinguished from small rice,* frost being the guage for its sowing and harvest, every clime must be regulated in the culture by experience.

With the respects of

His humble servant,

C. Drayton Junr.

Mr. John Lorain.

* Small rice is the small pieces broken off in beating, together with the eyes of the grain.

Profit of Soiling Cattle. By John Lorain.

Read December 11th, 1810.

Tackoney, 26th November, 1810.

Sir,

I have succeeded in soiling and selling the cattle mentioned in a former communication, and should your society consider the subject interesting to agriculture, will with pleasure detail the causes of former defeat, and the management which has, and I hope ever will prove successful.—At present, I propose confining myself to some observations on its very superior economy, compared with grazing, and to illustrate the subject from the practice of my own farm, shall subjoin the produce of this year, over and above soiling forty cattle and six horses, to wit.

1730 bushels of potatoes at 35 cents, the prices of this article are very fluctuating, and not always governed by a plentiful or middling crop; they were rated at the same last year, and sold for more exclusive of riddling, and hauling to market, and a loss sustained by frost, - - - - -	$ 605 50
817 bushels of corn, at 60 cents; this may appear high to some, especially as it will shrink considerably in the crib. I do not sell till the crib is wanted for the new crop, at which time prices on an average are high, - -	490 20
Carried forward,	$ 1095 70

Amount brought forward,	$	1095 70
222 1-2 bushels of barley delivered but no rice fixed; the brewer informed me not long since, he expected the market would be fixed at one dollar per bushel, - - -		222 50
247 1-2 bushels of wheat sold for $ 2 50 cents per bushel; seed retained, rated at the same price the purchaser hauled it from my barn, - - - -		618 75
Peaches sold for 85 dollars 66 cents, a trivial article, but the trees and gathering injured the crops on the ground near three acres,		85 66
76 tons of hay: 7 tons deducted, fed to the horses after the 10th of August, when proper grasses for the horses became very deficient. 69 tons at 12 dollars 50 cents per ton; hay-sellers will consider this too low, but it must be judiciously applied to be worth as much when fed away on the farm, - -		862 50
1430 loads of compost estimated equal in nutrition to 587 loads of dung. Farm yard and stable dung unmixed, 804 loads, the whole 1391 loads of 32 cubical feet each at 50 cents, - - - -		695 50
The purchasers of manure will consider this much too low, but this price pays attendance on cattle, and every other expense till it is ready for the crops.		
19 tons of corn stalks and husks, the tops and blades were given green to the cattle—		
Carried forward,	$	3580 61

Amount brought forward,	$	3580 61
the farmer in the practice of leaving his stalks in the field, and entangling his plough and horses among them in the spring, risking his shins at every step, would laugh at seeing them estimated in a crop. I find them cheap and excellent litter for the yards, they are with the straw not consumed by the cattle, charged together with raking woods, and hauling leaves every year to my manure account.— Price of stalks at three dollars per ton, -		57 00
Barley straw and chaff, valued at the cost of threshing and cleaning the grain, -		27 81
Wheat straw and chaff, valued in the same way, - - - - - - - -		37 12
Dollars,	$	3702 54

This produce has not been accumulated by a system free from errors and misfortunes: a large share of both has occurred very injurious to the crops, which will be explained, when I communicate the result of my corn and potatoe patch.

The tract 106 acres 85 in grass and under tillage; the residue woods, roads, yards and garden: had those 85 acres been in grass no better or thicker set, they would have been barely sufficient to pasture the stock, and taking into consideration the forepart of the season, I doubt whether under the very best management they would have been enough. One acre of good land well set with grass, is considered sufficient for an ox; but grounds subject to the plough, are rarely returned well set with artificial grasses, and are seldom rich enough to get quickly

covered with natural grass, and it is well known that cattle soon devour an acre of clover nearly run out, or indeed any other thin set grass: however the grounds are open to observation, except about 10 acres of the worst, the greater part of which has been ploughed for spring crops, and between thirteen and fourteen acres top dressed with compost, since cutting the first crop; but those are not yet so materially altered as to prevent investigation.

As every thing heretofore advanced has been founded on actual experiment, except the capabilities of the grounds to graze the stock, I am sorry that rests on opinion, and consequently stamps some degree of uncertainty, on every conclusion that may be drawn from the whole; but if this opinion is correct the produce stated above, has been rescued from oblivion by soiling, except the hay, which might have been mowed after the stock, as they decreased in number, had they been pastured on the grounds, and the advantage derived from their dung often dropped where useless, and seldom where it would be most beneficial.

An extra produce of 3702 dollars 54 cents, or of 43 dollars 55 cents per acre, on 85 acres, or of 34 dollars 92 cents per acre on the whole 106 acres, appears to demand some attention: and notwithstanding the prices forming this estimate, may be considered too high by many equally near to Philadelphia as myself, and must of course be curtailed to suit remote situations, the intrinsic value of the articles will still remain considerable, and if the numerous acres appropriated to pasture in Pennsylvania, are in proportion to the soil capable of producing in the same ratio, soiling is an object of high

consideration, provided it should hereafter be found to answer all the purposes of breeding, rearing, and fatting animals, equally as well as grazing; but of this very little is known in this country, and as far as my information extends, not much in Europe: a few experiments either here or there, cannot, ought not to overturn established and well tryed practice, yet as I believe it will answer all those purposes, having this year experienced no other difficulties than those arising from too scanty a supply of proper grasses, and have discovered none improper except red clover, and that only in certain stages of its growth, I cannot but wish to see enterprising farmers, who are in the habit of carefully inspecting the business of their farms, trying the experiment on a moderate scale: those who depend on others should not engage in it; any industrious observing farmer might without the least risk try it in a small way, if he only commences with his horse and working oxen, and has enough of proper grass, I will venture to pronounce positively that he will never pasture them again, while in his power to soil them in the yard: a trivial breadth of grass will support them, they will be always full and at hand, and the manure saved for his potatoe patch and corn hills, very considerable.

If your society wishes further report on this subject I should be early informed, for it embraces such a variety of objects that it must of necessity be lengthy, and particularly as I conceive it ought to be accompanied with an abridgement of my farm accounts for this year, clearly stated and correctly balanced, to shew from them what bearing soiling has on the profits of the farm, and whether under a judicious management of cattle, those

profits will pay a handsome interest on a capital of about 19,300, dollars vested in and employed on this establishment, which appears to me something like elucidating the point by mathematical demonstration.

As measurement and weight of bulky articles on a farm cannot be estimated with the same precision, as they are when carried to market I state below the mode on which the foregoing estimate is generally founded.

I am your very respectful humble servant.

JOHN LORAIN.

The first loads of potatoes were measured, and the carts marked, and afterwards filled to this gage; they have heretofore overrun on being riddled, the small at first lay between the cavities of the large.

The corn was all correctly measured in a tub very similar to a Maryland corn barrel, one was shelled and measured from which the crop is estimated it; is evident this will shrink in the crib, but I have no certain rule to determine how much.

I consider eight square feet or 512 cubical feet forms a ton of hay in a well settled mow; where it lies shallow or is not well settled, allowances should be made.

The mode of measuring dung is explained in a former communication.

On a Wool Micrometer.

Read December 11th 1810.

Belmont, November 25th, 1810.

Sir,

DR. LOGAN has been so obliging as to be the bearer of a WOOL MICROMETER. I beg leave, on behalf of our worthy member ROBERT BARCLAY Esq. of *London* and *Berry Hill* near *Dorking*, England, and in his name, to present this valuable instrument to the society. In his letter to me of the 31st July 1810. Mr. Barclay writes—

"By Dr. *Logan* I have sent you, for the use of our society, an instrument introduced by Sir JOSEPH BANKS, only at the last *Woburn* sheep shearing,—a WOOL MICROMETER, to ascertain most accurately the quality of our wools; which be pleased to present, in my name to our society; as from the patriotic exertions lately made in the United States, to improve your native wool, by crosses of the true *Merino*, I presume this new instrument will prove acceptable."

I am much gratified, and, no doubt, the society will be impressed with feelings similar to mine, by this instance of polite and useful attention and kindness in Mr. *Barclay*. Although highly acceptable, at any time, the arrival of this instrument, at this period, when its utility is peculiarly important; adds to its value, as it respects ourselves.

The drawings accompany the instrument; and directions for using it.

I am, Sir,

Your obedient servant.

RICHARD PETERS.

Dr. JAMES MEASE.

Secretary to the Philad. Soc. for promoting Agriculture.

We have not yet had time to arrive at a perfect knowledge of this micrometer, so as nicely to discriminate between the samples of wools. The filament sent with the instrument is $\frac{16}{10000}$ parts of an inch, in fineness. The wool of my ewe No. 2 in the plate, is agreed, by all who have viewed its filament through this micrometer, to be several degrees finer than that accompanying that instrument.

R. P.

FIG. 2.

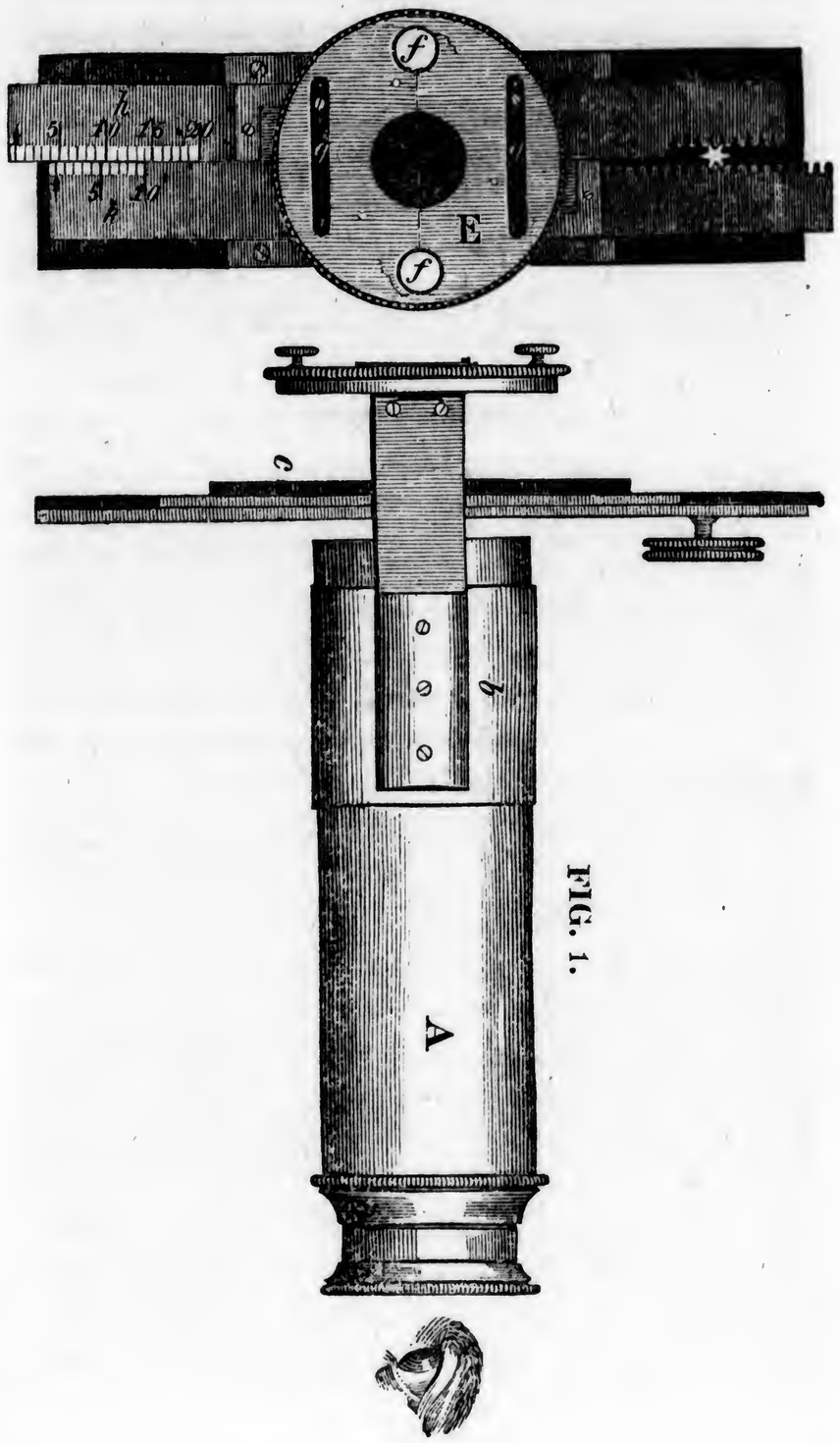

FIG. 1.

Directions for using the Micrometer.

Fig. 1. A, The body of the microscope in which a tube is made to slide containing the eye glasses; this motion is necessary for obtaining distinct vision, b, the slider by which the object is adjusted to distinct vision in the first case; c, the plate on which the divided glass is placed, d, the pinion, by which the divided glass is moved.

Fig. 2. E, The plate on which the objects are to be placed; this plate is made to turn on a centre, so that the diameter of the object to be measured may be placed at right angles to the motion of the divided glass f, f, two milled headed screws; to hold the object. g, g, two springs for the same purpose.

h, The scale, k, the vernier, each division on the scale is equal to the 1000 part of an inch, seen in the place of the object, which is subdivided into ten by the vernier, k, therefore each subdivision is equal to the $\frac{1}{10000}$ part of an inch seen in the place of the object.

Great care should be taken to adjust the object to distinct vision; as on that in a great degree depends the accuracy of the measurement. There is a circle on the body A, fig. 1, which is nearly the proper place for the slider, b, The filament of wool sent in its place, with this micrometer, will be found to measure $\frac{16}{10000}$ of an inch.

Farther Remarks on Mixed Crops of Corn and Potatoes.

Read January, 1811.

Tackoney, 13th December, 1810.

Sir,

I resume the detail of my mixed crop of corn and potatoes, commencing where I left off the 21st May last.—The corn was earthed up once with the plough, and hand hoes immediately followed after it; in this state it continued until it again became necessary to subdue the weeds, at which time the ridges were hand hoed barely deep enough to effect that purpose; it was suckered three times, twice would have been sufficient, had not re-planting occasioned great irregularity in the growth; the re-planted part was dressed with gypsum soon after it was up, hoping this would assist it to contend with the roots and shade of that which had taken the lead; but it produced no perceptible advantage, oppressed by its powerful neighbours, it became feeble, useless, and actually injurious (except in places where the first planting had altogether failed) in a space sufficient to prevent injury from its roots and shade, and the extensive failure in the original planting required one fourth as much seed as was planted at first, from which I infer an immense loss in the crop. When the corn was from 5 to 7 feet high, a tremendous storm levelled it to the ground; had it been left in the hands of nature, the injury would have been inconsiderable, but

all the hands I could get were employed in setting it up; some of them being awkward, broke the plants, and sadly mangled the roots, and it was not until about seven acres had been set up, that I observed the active power of vegetation was performing the operation infinitely better than the most expert workman in the field. After this two other storms blew down a considerable quantity, when the ears were too heavy for it to rise, and although part of this lay flat on the ground, it was not observed that the filling of the ears were injured, but it became necessary previously to ploughing up the potatoes to remove those plants out of the way, which it was found had rooted from their joints fast to the ground; with a sharp hoe those roots were easily cut, and the plants readily laid aside with but little injury, while I was present; but other business demanded my attention, and the crop sustained very considerable damage from the carelessness of the person who did this work: these disasters, together with calculating the roller from its round instead of the round of the extremities of the indentures, reduced the fruitful plants in the field to one half the number originally designed. They were ascertained by measuring a rod in various parts of the field, when the ears of the re-planted were well formed, and estimating the average of fruitful plants within those distances, and from that moment I clearly perceived my high expectations were blasted: but the disasters of this ill-fated experiment did not stop here; early in August, it was discovered that proper grasses for soiling the cattle would soon be very deficient, and on the 20th of that month one row of corn was topped, to ascertain how it would bear early cutting, and it was

thought that it had received no injury, and on the 31st of the same month commenced feeding the cattle with the tops, cut daily as wanted, except the re-planted, which was considered too young: these lasted them 'till the 18th September, when the blades were stripped, commencing where the topping began, and these fed the cattle until the 5th of October.

In the progress of topping and blading, one row was left entire along side of the row topped the 20th August; both those rows, and also another row along side of the row first mentioned, were all cut off by the roots on the 2d of October, and hauled in and set up separate, under my own inspection. They were husked and measured on the 8th of November.

Produce of the row neither topped or stripped 9 5-8 bushels of corn in the ear.

Produce of that topped the 20th August and bladed 20th September, 7 6-8 bushels of corn in the ear.

And the produce of the one topped the 2d September and bladed the 20th of same month 7 3-8 bushels of corn in the ear.

This experiment strongly indicates that if all the crop had been topped as late as the 2d of September, and bladed on the 20th of the same month, that the loss on the whole field from those operations would have been more than 230 bushels, but as those rows stood near where topping and blading commenced, it must have been less, yet certainly very considerable, for throughout the whole field the husks were generally dry and open, except on the row which had not been topped or stripped: on this they still retained a greenish hue, and

were close set to the ear: indeed the difference was so manifest at the time this row was cut off, that it alone convinced me, that necessity had urged a measure extensively detrimental to the crop, and this in direct opposition to former practice founded on attentive observation, that fodder was better saved with one half the expense by cutting off than by topping and stripping the corn, while the ears appeared to derive considerable advantage from the plants remaining entire.

The potatoes were once earthed up with the plough, after which the weeds likely to out top them were removed by the hand, and they would have been luxuriant had it been sufficiently considered that nature designed them to grow under the ground, for the high planting and dry weather while they were fruiting reduced their usual size considerably.

The ground where these crops grew measured 13 acres, 24 3-4 perches exactly: one half appropriated to the corn and the other half to the potatoes.

Produce 817 bushels of shelled corn, and 1730 bushels of potatoes.

This forms an average of 263 bushels of potatoes, and 124 bushels of shelled corn per acre, if I may be permitted to assign to each the ground they occupied.

It may appear strange that after growing such a crop of corn, the details of the injuries it sustained should be so lengthy, but it should be remembered that it was an experiment projected on an opinion, that close planting on well manured ridges, sufficiently distant from each other to give full scope for sun and air, would produce as much corn on each acre and save half the land for other crops, as could be produced if the whole ground

had been occupied by corn planted in the usual way, but of this the experiment has fallen short nearly one half, for 118 bushels of shelled corn has been grown per acre; this was a wager crop, perhaps too highly manured for wheat to follow, yet from my observations on the ridged rows of corn last year. I did not expect to be far behind that very superior crop. The ears of my present crop have been generally larger than any I have grown heretofore, two of the largest size which have been laying four or five weeks on a shelf close by a stove and are perfectly dry, have been shelled, and measure full a quart, or a pint each, but it is impossible to determine whether the ears of this crop would have been diminished in size, or if so, to what extent, had the re-planted been able to contend for their share of nutriment, and had the number of clusters originally designed been planted, this remains to be determined hereafter: but the result of this crop clearly determines, that this mode of planting will produce large crops of corn, while it reserves one half the ground for other valuable purposes, provided the quantity of plants do not exceed the number of fruitful plants in this field, to wit, about 33 within the length of every perch on each ridge; and also, if topping and blading be omitted, and the plants are not cut off until the grain has nearly arrived to perfection, and the effect of storms are left with nature to repair; and although re-planting is frequently beneficial to crops planted in the usual way, in the case under consideration it proves injurious, and every possible precaution should be used to render it unnecessary. I once succeeded by planting eight grains where only three were designed to stand, and a boy of eleven years old, with

a little instruction and a trivial expense, thinned them to my entire satisfaction, as soon as they were out of the way of grubs and crows: and I expected to escape re-planting this year by dropping six grains where only two were designed to stand, and keeping a boy in the field to drive off crows: the seed ears were selected and a little shelled off each end of the cob, reserving the remainder for planting. I have since been informed by an observing farmer that the hearts of two or three grains from each ear designed for planting should be examined with a sharp knife, and if they are found to adhere closely to the flint on each side, and are otherwise sound and healthy, the ear from which they were taken may be relied on: perhaps this precaution in addition to an unusual quantity of seed might go far toward ensuring a sufficiency of plants if crows are kept off.

Potatoes cannot be grown extensively except for cattle, and it has been asserted by many who are well informed, that they will not pay for cultivating, if expended in this way; they are also a troublesome and perishable crop, and come off too late for the corn to derive any advantage from turning the ground they occupied to it, consequently the space left between corn grown in this way, cannot be so extensively useful until plants are selected for this purpose, that will combine the destruction of weeds, an early harvest, with a capability of withstanding a sufficient manuring for wheat, and grass seeds to follow, and that are not perishable, and do not require huckstering to get them off; and there are plants which it is believed will answer all those purposes, but I do not learn that they have been grown in this way, and perhaps some of those would better accord with

planting the corn one foot wider asunder without diminishing the number of plants per acre, as much larger scope will be provided for their roots with the advantage of more sun and air.

The corn and potatoe grounds are now in wheat, sown with rather more than two bushels per acre, after one ploughing commenced in the middle of the potatoe rows (rendered flat by the cleaning harrow) and ending in the middle of the corn ridges on each side, forming beds of eleven feet each from the middle of the water furrows. The execution was easy, and when finished, equal in appearance to any field I have ever seen; it will be sown with grass seeds in the spring, to be mown five years: one exhausting crop immediately following another of the same kind, seems to require an apology or explanation, and not knowing which would suit best, what is offered will be applicable to either; manuring well for corn has so far secured me a good crop and left the ground clean and rich enough for wheat or barley, of which I have had superior crops free from weeds, and consequently easier and safer harvested, and the land left not too much exhausted for grass seeds. This short round I conceive produces more grain than a longer one would do on a larger breadth of ploughed ground, and leaves more land for grass, which, while it is adding to the revenue of the farm, is daily accumulating riches for future grain crops.

Yours, &c.

JOHN LORAIN.

N. B. Perhaps it will not be known to all who may wish to plant potatoes among corn, that the vines of the

latter die nearly as soon in the shade of the rows as the early sorts. I have tried a variety, and find none answer near so well as a kind which are said to have came originally from Rhode Island; they are not as soon fit for the table as the earliest variety, but by harvest are as large, and soon attain perfection; only few grow at the root, and those mostly large and closely set to the stem, and will produce large crops if planted very close in the row; if planted among corn, they should be first put in, that they may get as forward as possible before the shade of the rows becomes injurious.

On Soiling Cattle. By John Lorain.

Read January, 1811.

Tackoney, 20th December, 1810.

Sir,

I purpose at this time to enter no further into the subject of soiling, than what relates to the grasses for and against it, and the management of the cattle, unless as I proceed it may be considered better to make observations now, on some other things connected with that system.

The varieties of grasses on this place are very inconsiderable; green grass, timothy, and orchard grass, have been my principal dependence for soiling the cattle, but there is also some blue grass, white clover, and other native grasses, and to none of those have they discovered any marks of dislike, and they have been tried with some very coarse from a wet spot in a bottom meadow, to which they did not object; they will also eat crop or fall grass freely, likewise a multitude of weeds which they reject in the fields, and having been compelled from necessity to cut a barley stubble crop of tall oat grass for them, they also eat this freely, and as it has since grown sufficient for a short cut with the scythe, promises great usefulness in soiling.

If the cattle are fed with red clover in the spring before the heads are beginning to form, they will in general eat but little of it for the first day or two, but after this feed more freely on it, and when the heads are pretty generally formed or forming, they continue to eat

it freely until the first crop gets rather old, when it produces what is termed a salivation or slobbering; this may proceed either from the suckers of the second crop springing from the roots, or from the poisonous sap (which is supposed to be produced at this season) rising up into the old stem; or by the decaying under leaves of the plant disposed at this time, from some hidden cause to collect poisonous properties, for it is said the grain of wheat sometimes becomes highly impregnated with poison from damage sustained while standing in the field; but as insects of various descriptions have generally been thought the primary cause of most of the evils attending vegetation, and men of superior information confidently assert, that the smut and mildew in wheat are occasioned by them, and it may hereafter be discovered that insects are the cause of this malady in clover, and as the ravages of those have been generally periodical, it seems to accord with the prevailing opinion, that clover has not long been affected in this way. The person who has cut grass for my cattle during the three years of soiling, has frequently informed me, that after long continued rains, or drifting and moist weather, the red clover got affected with a rusty appearance on the stalks, which he considered the cause of the rejection of it by cattle. I have observed this appearance on well saved second crop hay, yet it excited but little attention until very lately. If insects are the cause of this evil, perhaps with proper glasses, traces of their ravages may now be discovered in the stalks of the second crop hay, if not, the ensuing summer will afford ample scope for investigation.

Unless a remedy for this malady in clover should be discovered, it cannot, consistent with the preservation of a necessary rotation, be used for soiling longer than until the green grass or orchard grass are ready, without recourse to the plough, which, unless under certain circumstances, may be found too expensive; and if guinea or broom corn is sown for this purpose, a gap will be left between them and the clover, to be filled up with some other green food, for which purpose it is thought timothy might answer, if the Guinea corn is sown early on a good soil; the patch of that plant mentioned in a former communication, produced a better third crop than was expected, from the late planting and complete shade of woods on two sides of the patch; it was left standing until frost, and found as tender, or perhaps more so than Indian corn. *Query*, would gypsum be a manure for this plant.

Clover from the first commencement of its being affected, has through the whole season afterward been injurious to the cattle, and that as far as could be determined by the eye, in exact proportion to the mixture of it contained in each load, unless the quantity of it mixed among the other grasses was too small to produce any perceptible effect; yet when the proportion of clover did not exceed above one-third, both cattle and horses eat it freely, and appear to do well, but as they still slobbered some, it is thought they would have done still better, if the mixture had been much less, or if the red clover had been altogether absent; it was also very observable that they were not all affected alike, for while the great majority were all but starving on clover, or too large a mixture of that plant, a few continued to eat

sufficient to keep them up, and those did also better on the second crop clover hay through the winter and was soonest sold to the butcher. But it is not only in soiling and in the hay, that the detrimental effects of second crop clover are felt; grazing on this plant has been found by many a very precarious business, and a neighbour had to turn out his cattle last fall on the roads to prevent them from starving on a profuse pasture of this grass, yet on my farm cattle have done tolerably well while grazing on fields, parts of which had been previously mown and given to them in the yards, and was found so obnoxious that they would scarcely eat sufficient to keep them alive, from which it would appear, that while at liberty in the fields, they either have sagacity to select those parts of the clover plant which are least injurious to them, or to find other plants calculated in some measure to correct its baneful effects, and also that they may be soiled on the first crop of red clover, until it becomes too old for that purpose, and after this turned out to graze, which would considerably increase the quantity of first crop hay, as well as the manure, by which means their soils with the aid of gypsum might in a short time be sufficiently enriched to grow grasses suitable for a regular continuation of soiling throughout the whole season.

That there may be other plants which will slobber cattle is by no means improbable, but it is thought they cannot be numerous on this place or their effects would have been discovered.

Orchard grass is excellent for soiling cattle, it starts early, continues late, grows rapidly through the whole season, and incomparably faster than red clover in the

fall; it starts instantly after the scythe with almost incredible vigour, neither waiting the healing of its wounds or fresh shoots from its roots.

Timothy appears to suit the sellers of hay better than those who feed all their hay and grass on their farms; after the first cut but little is to be expected from it, unless growing in rich moist bottoms, yet with the addition of this grass, cattle may be longer kept on the first crop, and perhaps earlier fatted for market, and I have observed none that they eat more freely or on which they thrive faster.

The green grass on this place has grown after clover which had run out, and as it has not been in my power to enrich those grounds until this fall, consequently the crops have been light; but I have observed on spots accidentally enriched, that the vegetation has been quick and luxuriant; whether it will require too much manure to bring the rest up to this standard, and to keep it so, is to me entirely unknown, but I find it forms a close pile, springs early, arrives quickly to perfection, and stands the nipping frosts of winter perhaps better than any grass which grows on this place in sufficient quantities to excite attention; and notwithstanding the ground was thin and the first crop cut late, it has generally afforded a tolerable third cut, the greater part of which has been fed green to the horses and cattle in the yards. The mowing commenced the 13th of November and continued until the third of December, when a fall of snow put a stop to the scythe, and it is likely to all further progress in this business, as the grass which is now left would, under the most favourable circumstances, be rather short for the scythe, but if it were long enough I should certainly expect to proceed, as soon as the snow and ice are out of the way; for a considerable snow which fell on the 1st and 2d of November, and laid for sometime on the grass which has been cut since, produced but trivial inconvenience. A little patch of tolerable grass of the same sort has been reserved, to ascertain whether the old foliage, together with the young sprouts, which it is expected will spring up sooner under this warm cover, will not form an early and profitable cutting for cattle in the spring; for if a late and early cut can be provided for the yards, no part of grazing can be managed as economical as soiling, and the rapidity with which the soil may be improved by the latter practice, must recommend it to attention when it has been sufficiently considered to what extent manuring may be carried on a farm, the grass grounds of which are all subject to the scythe, and the hay, grass, straw, leaves, *weeds*, corn stalks and their ROOTS are all attentively gathered and brought into proper use in the yards, and that this may be effected in some situations without resorting to soiling is evident, but it is equally evident, that those situations are too inconsiderable to produce effects materially interesting to agriculture. To illustrate the extent to which manuring may be carried, facts will be produced as far as they will go, and the deficiency supplied with speculation, which it is thought will not fall far short of demonstration. This farm has been subject to this system only four years, and at this time may be justly considered in the infancy of improvement, and this year 13 acres have been highly manured for the summer fallow crops, and be-

tween 13 and 14 acres of grass top dressed, and there remains on hand of the manure collected during twelve months, a balance sufficient to top dress nine acres more, and it does not appear unreasonable to suppose, that the capability of producing manure will extend in proportion to the increased vegetation of the soil until it reaches its zenith of perfection; it is considered proper to mention here, that when I moved to this place in the fall of 1806, twenty cart loads of dung were hauled on it, and the stock of hay being only ten tons (which was the whole that had been made that year on the farm) rendered it absolutely necessary to purchase that article, and when hay has fallen short some has been purchased since, the whole from first to last amounting to about 30 tons of hay and 2 tons of barley straw.

With respect to the management of cattle, it is indispensably necessary, not only to their thriving, but likewise their health, that dry places be provided for them to stand and lay down upon during wet weather; and litter is generally expended before soiling commences, if the common yellow loose clay of the yards is pitched into their sheds, until the floors are raised sufficiently high to give them a considerable sloping descent from the cribs, ending at the front of the sheds in a step of 6 or 8 inches above the level of the yards; this purpose will be so completely effected, that without a wisp of litter they may be kept dry, throughout the longest continued summer or autumnal rains; the cattle will tread those floors perfectly hard in a few days, unless rain should intervene, and in that case a thick covering of litter if put on in time will secure them from injury; they should be kept covered after hard

frost commences; when the dung is likely to incommode the cattle, the yards and sheds are scraped, and it is hauled out and mixed into compost to prevent further evaporation; this appears to be a very wasteful management of dung, and if the cattle would thrive equally as well tied up, the difference in labour would be more than compensated in the quantity and quality of the manure; and European writers say, soiling in airy sheds and cool stables answer, but whether difference in climate or the habits of cattle are against that practice here, is unknown to me; but I suspect the difference in expense would be found trivial or perhaps not any; for the scraping extensive yards as frequent as necessary, can be little less expensive than the daily cleaning of the stalls, and the wheeling from the yards to the stercoraries will be more scattered and distant, consequently more expensive than performing the same work daily from the sheds. If this reasoning be correct, there can be but little, if any difference in the expense as it respects the dung, and I strongly suspect, two cart loads of that properly saved, would produce more vegetation than three of that which had been drenched with the rain and scorched with the sun, and it only remains to make a set off against geering and ungeering the cattle twice per day, (they do not require much water when on green food) and scraping the dung off from them once in the same time; and this it has been found may be speedily and sufficiently performed with a piece of an old scythe fixed into a wooden handle. When the cattle are tied up less than half the shed room will suffice, the cost of building, repairs, interest, and ultimate decay will be saved; it will be less expensive to spread the grass

in half the number of cribs, and it will not be injured by the cattle surrounding the cart, or the labourer hindered by their being in his way; underling cattle will have an equal opportunity of feeding, and there will be less risk of their injuring each other, and this is a subject of some consideration; an ox was gored in my yard last spring, and it was not without considerable trouble and expense that his life was preserved, and I had a cow killed last year in the same way, and if the cattle were tied up in winter also, it is thought a sufficiency of litter might be saved for the summer, as it requires vastly more to keep yards properly covered than would be necessary for stables and sheds.

I have found cribs preferable to racks for soiling cattle: when grass is put in the latter, they get it quickly under their feet; if the former are wide enough they feed with their heads over them, and the waste is inconsiderable.

It has been my practice to give the cattle fresh grass from the scythe morning and evening, but as the morning feeding is sometimes later than would be desirable, perhaps the grass designed for the morning might be cut toward evening and left in swarth; raking up grass until it is wanted should be avoided, as it is liable to heat, and it is also very improper to let it lay in the field exposed to the sun: in either case it is not relished by the cattle.

The cribs should be carefully cleaned out every morning, and the contents may be made into good hay in the cheap and easy way mentioned in a former communication; but this requires attention or it may not be properly shook and spread out, and not only spoil, but perhaps set fire to the building; however after the gage of the cattle is known, there will be but little grass left over, if proper attention be given and the quality is good.

Labour appears too high in this country to admit of cutting straw with the grass, but it is likely that the love of variety might induce the cattle to eat some of the best quality, if attentively given in small quantities, and it has been considered by some a useful corrector of the purgative properties of grass.

The confined situation of the cattle in the yards, is peculiarly favourable to the prevention of loss from eating green food too freely at first, but requires close attention for a few days in the beginning. When any of them appear rather full, they should be immediately placed where they can get nothing to eat or drink, and if this fullness is followed by a restlessness discovered from unusual movements, particularly with their feet, and an extension of their tails as if straining to discharge the wind, and generally accompanied with a disposition to lay down, it then becomes immediately necessary to keep them in pretty smart motion, which enables them to disengage large quantities of wind, which is sometimes accompanied with frequent discharges of dung, and when their flanks get lank, further attention at that time is unnecessary; there were only two in my yards this year, with which I had scarcely any trouble.

A little good first crop hay should be kept for feeding, when the weather is too bad to admit of cutting and bringing in grass, but during the whole feeding of last season, a resort to hay was not found necessary more than three times; a healthy Irishman who feared no weather, performed this work at 10 dollars per month,

with board washing and lodging; but it was under an expectation of a present at the end of the year, if his conduct merited it; but confinement every sunday not being agreeable to him, the rest of the labourers on the farm took each his sunday in rotation at this business, for which they were paid exclusively of their monthly wages, and at the same rate, but no compensation is expected for sunday attendance on the cattle during winter, such attendance being customary.

Numbers appear to dread the trouble and difficulty attending soiling, who cheerfully acquiesce in winter stall feeding; and the cleaning of troughs, varying food, and humouring the appetite of animals, both in respect to quantity and quality, is submitted too without murmuring, because they have been accustomed to it, notwithstanding it frequently happens, that accidental or injudicious feeding but once, satiates cattle so much, that it is found very difficult to get them to feed well afterwards: not so with soiling, if too much be given, the cattle will eat until they are fully satisfied, and if after this is done, they become displeased with the remainder in consequence of its having laid too long in their cribs, if the contents are removed and fresh grass given, they eat as freely as if nothing of this sort had occurred; neither have I observed variety necessary to stimulate their appetites, but it is observable that although in the field they are fondest of the tenderest shoots, in the crib it is otherwise; there, tender grasses form a compact mass, with which they are not so well pleased, as when further advanced in their growth, and this circumstance appears to form a solid reason, why it has been found in Europe, that the same cattle gained

more by soiling than they did from grazing, for there can be but little doubt, that grasses at or near maturity contain a larger share of nutriment and are less disposed to purge the cattle. I have also noticed, that when the grass gets quite old and is dying as it stands in the field, they are not so fond of it, but still continue to eat it more freely than the young and tender grasses.

I have obtained an early cutting from rye sown thick on ground designed for potatoes, it was ready about the first of May, and proved valuable, as red clover was about a week later.

Cattle are fond of oats cut green, and it is said by many, that poor land is much improved by sowing them for pasture, and I observe one gentleman attributes a large share of the improvement to their roots, but whether this is, or is not the case, it can scarcely be doubted that the improvement would be much greater by feeding the tops in yards.

And am, Sir, with respect,

Your obedient humble servant,

JOHN LORAIN.

JAMES MEASE, M. D.

On the Salivary Defluxions in Horses.

The following papers were written at the request of Mr. William Young near Wilmington Delaware, and by him forwarded to the society.

Read January 8th, 1811.

Wilmington December 25th 1810.

Dear Sir,

In conformity to promise, I communicate to you the result of some observations and experiments I have made on the SPOTTED SPURGE, *Euphorbia maculata* of Linneus, particularly relative to its being the cause of the salivation that has occurred so frequently among horses in this and the adjacent part of the country. Although my experiments have been but few and simple, I conceive they have been sufficient to establish the fact. The frequent occurrence of a profuse discharge of saliva from horses, and its rapid production of great debility and emaciation in that useful animal; had not only excited the attention and surprise of many of the farmers; but had also given rise to many conjectures as to the cause of it.—Many opinions were founded on no substantial data, but originating only from conjecture; by many it was imputed to a peculiar quality inherent in the second growth of clover,—its generally appearing first when horses were put to pasture on the second crop, and being almost exclusively produced by pasturing in clover fields, were considered as corroborating evidences of the correctness of the hypothesis; but its not having occurred for many years after clover had been extensively cultivated; and not occurring at all in many places, where horses are pastured almost altogether on clover; sufficiently proved that opinion to be erroneous. It was also imputed to the effects of gypsum on plaister so frequently used to promote the growth of clover, but the occurrence of it on many farms where no plaister had been used, as well as its not having occurred on many where it had been used very copiously, proved this opinion equally incorrect with the former.

My friend Dr. William Baldwin of Wilmington informed me, that a member of the Linnean society of Philadelphia had supposed, that the ptyalism was caused by a species of the euphorbia. He also politely favoured me with a specimen of the species to which it was imputed, and gave me some information on the Euphorbia Americana in general, which extensive knowledge of botany enabled him to do. For the purpose of ascertaining the fact, I procured a small quantity of the Euphorbia maculata, and gave it to my horse enveloped in a small quantity of clover carefully gathered stem by stem, and perfectly free from all other vegetables or any extraneous matter whatever. A preternatural discharge of saliva took place in less than half an hour. This experiment was frequently repeated, and invariably with the same result. To prove that clover did not contribute towards it, in some cases other grass was used as an envelope with the same effect. And when the horse was perfectly free from ptyalism, a considerable quantity of clover carefully gathered without the euphorbia was given to him, and no such effect was produced.

These experiments I considered sufficient to prove that the *Euphorbia maculata* would produce salivation. And I am induced to think for reasons that I shall hereafter mention, that it is the general, if not the only cause of it.

There are three species of euphorbia common in our fields: the *maculata*, *caniscens* and *corolata*, of Linneus. There are more species of *euphorbia* natives, and some *exotic species* now flourish in our country, but their peculiar habitudes confine them to certain districts. Of the three species above mentioned, either would probably cause salivation if masticated: but the peculiarities of the maculata render it the only one likely to be eaten by horses. None of them will be eaten if not so situated or presented, as to be taken into the animal's mouth along with some agreeable grass, as clover. The *corolata* is a large plant towering above the grasses, and therefore easily avoided. The *caniscens* is an humble plant attaching itself close to the ground without elevating any of its branches, and seldom flourishing among the grasses; but generally confined to open grounds, or cornfields road sides &c. on these accounts it is seldom eaten. The maculata delighting in the well cultivated clover ground, and when closely surrounded by the clover attaining to about the same height, and sending off many slender spreading branches, it is very liable to be taken in with the clover by the larger mouthed animals. Whether this species of *euphorbia*, has flourished for a length of time in this part of the country, or has but lately migrated into it, I have not ascertained, but in either case, its having but recently intruded itself into the pasture fields can be easily accounted

for. It comes forward, flowers and ripens its seed, about the same time with the second crop of clover. And as clover seed is generally gathered from the second crop, it must be very liable to have some of the seed of the *euphorbia maculata* gathered with it, if any of it had grown among the clover; and in this way may be extensively diffused over the country. The salivation was observed in the neighbourhood of West Chester, and other parts of Chester county, before it was seen in this neighbourhood; and as the farmers here have generally obtained their clover seed from thence, it seems highly probable, that it has been introduced in that manner.

As but few of the grasses, except timothy, were propagated by seed to any considerable extent in this country, before the introduction of clover, and as the low flat grounds on which timothy grows, and the closer sod it forms about its roots, are unfavorable to the euphorbia maculata, it is not singular, that, before the cultivation of clover, it should have been confined to the margins of fields and open uncultivated grounds, its native place. As this plant is not furnished with any of those astonishingly curious apparatus for dispersing its seeds that many are, and not being eaten by any animals except by accident; it had not the advantages of any means of emigrating from its native location, previous to its connexion with its friendly associate *clover*.

All the plants of the genus euphorbia contain an extremely acrid juice;—many of them stand at the head of the catalogue of vegetable poisons, many of them, when rubbed on the skin, will produce excoriation: and the least acrid, when taken into the mouth, act as powerful masti-

catories. The euphorbia maculata possesses its greatest acrimony when in flower, or a little before: and at that time the salivation has been observed to be most prevalent. Most plants when thoroughly dried in the sun lose much of their virtue. This is also the case with the euphorbia maculata, for this reason hay, containing it, thoroughly dried in the sun, will not be near so productive of salivation, as when it has been slowly dried in cloudy weather. This circumstance I think worth attending to, in gathering hay containing it. Horses and hogs are the only animals, that I have observed, to be subject to the salivation. Why it does not affect the ruminating animals, I have not been able to ascertain. Probably future observation may enable me, or some one else, to account for it. At present I shall not hazard a conjecture.*

From the foregoing observations I think it extremely probable, that the plant in question is the general cause of the salivation in horses. There are other plants besides the euphorbia, that will act as masticatories: but I believe that there are but very few of them flourishing in our fields, that are liable to be eaten by the graminivorous animals. I am perfectly satisfied that the euphorbia maculata will produce it; and I have always observed it to abound in the fields where ptyalism was prevalent.

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* Several members of the Society have remarked, cattle sheep and swine as well as horses, to be affected by the second crop of clover, and of other grasses.

If this communication will afford any service or satisfaction to you, sir, you are at liberty to make what use of it you may think proper.

Your humble servant,

ABRAHAM PERLEE.

WILLIAM YOUNG.

On the salivary Defluxions of Horses.

Wilmington, December 27th 1810.

My Dear Sir,

The plant that has been supposed to produce *ptyalism* in horses, of which I gave you a verbal account last summer, and of which you now wish a description, I take to be *Euphorbia maculata* of *Linneus*. It is placed in the class of *dodecandria*, and order *monogynia*, of the sexual system. The *genus* is characterised as follows, in the last edition of the *system of nature.*

Calyx 1 leafed inflated, inferior: nectaries 4 or 5, standing on the calyx: *capsulæ* on a pedicle 3 lobed.

The noxious species which is the particular object of our investigation, is thus described in the same work.

Forked: leaves serrate oblong, hairy; flowers auxillary, solitary: branches spreading.

Leaves when young, marked with a brown spot.

The *Euphorbia* are a very numerous as well as natural family of plants, and all the species appear to possess a particular acrimony.

Out of *one hundred and twenty-two* species enumerated in *Turton's edition of Linneus, only five* of that number are described as natives of North America; several other species, however, are now known to the botanists. There are three species to be met with in this neighbourhood viz. The E. colorata, E. canescens, and E. maculata. The E. *colorata* is generally found growing in uncultivated situations, but mostly within uncultivated enclosures, as in hedges and by the side of fences. It is an erect plant, and grows to the height of several feet; branching outwards, and exhibiting a handsome appearance when its white flowers are fully blown. The E. canescens which *Linneus* has restricted to *Spain*, is an humble plant, trailing close to the ground, but without emitting radicles. Both these vegetables are found in dry situations. But the *E. maculata* with which we are more immediately interested, although it is to be mostly met with in greater abundance on the margin of dry pasture fields, is more generally diffused over the cultivated parts than any of the other species; and, begins to be in flower about the latter end of July, or the beginning of August, and continues to flower for several weeks; during which time it, no doubt, possesses the greatest acrimony; and it is during this time, that the horses are most commonly affected with the disease known to the farmers by the name of slabbers.

A memoir was read a few years ago, before the *Linnean society of Philadelphia* on the ptyalism of horses, in which the *author* stated the E. maculata to be the cause; but I have not seen this memoir; nor have I been able to obtain any important information respecting it. In all probability your investigation will be more satisfactory and conclusive. In a conversation, however, which I had a few days ago with Dr. Barton, he informed me, that he believed several vegetables had a similar effect with the E. maculata in producing the *slabbers;* and that he has known this disagreeable disease to be produced by *dry clover*, which he supposed to be in a diseased state.

I am Sir,

WILLIAM BALDWIN.

Dr. ABRAHAM PERLEE.

Changes of Timber and Plants, Races of Animals Extinct.

Read February 12th, 1811.

Belmont, February 4th, 1811.

Sir,

Last week, a British publication, entitled, "The Eclectic Review," for July 1809, was put into my hands; and it was the first time I had seen it. It furnishes one of those minor means, designed or not, by which irritations (injurious to the interests of both) are kept alive, between the people of the two countries. I have nothing to do with such considerations, as a member of our society, farther than as they tend to destroy the usefulness of facts, very innocently (whatever may be their relevancy) brought forward, to promote the objects we have in view. Had this publication been confined to the country in which it originated (without meaning to slight the opinions of the few, whose notice any thing relating to me would attract) I should have been perfectly indifferent about it, had I been informed of it. Its want of candour and truth, would only have excited an indignant smile.

Notwithstanding the superficial objections, made by the writer of the article in the British Review, to my relying on the changes of timber and plants, as an example set by nature, to shew the necessity of changes of crops; I still continue of my former opinion. It may not be necessary in the old world, wherein almost every thing is artificial; and the principles and practice of husbandry are better understood. But here, where the wildness of nature is constantly in view, the attention of our farmers being called to her operations, will produce conviction, sooner than elaborate discussion, or technical example.

In my endeavour to shew the necessity of changing crops, and the utility of also changing the locality of animals (the former well known, in Europe, to be essential, and the latter thought to be so by many) I mentioned, in our first volume, a number of facts within my own knowledge, and procured testimony from very respectable sources, corroborating those facts, as to changes in natural products of timber and plants, which are undeniably proved. I have known them to be true, from my youth. I think them very strong indications of the absolute necessity of changes of products, in agricultural operations. I also conceive, that great support is afforded to the opinion, that change of locality is necessary, to preserve domestic animals from deterioration, by the facts, in frequent proof, that when one race of wild animals migrates, or becomes extinct, a different race, or races (in obedience to a natural propensity to change) is, or are, found in the haunts of those precedently in the occupation of them. I had intended to have prosecuted this inquiry, and to accumulate a multitude of facts on this subject; and I may yet, at a time of leisure, perform my promise. Mean time, I hold it a duty I owe to myself, to say, that I never have had the most distant idea of bringing into view these, or any other facts, to support hypothesis, or theory, of any kind. On the contrary, any candid reader will see, that I cautiously avoid all such vain and unnecessary speculations. My

object is, entirely, to recommend useful practice. I hold no opinions contrary to those generally received, as to causes of renovation, or changes, of vegetable, or other productions. As to changes of locality, or substitution, of animals in a state of nature, I never conceived any other mode of supplying the places of those which had been destroyed, or had migrated, than that of other animals roaming, from other quarters, to fill the vacant haunts. If any objectionable opinions are held by others on these subjects, let *them* be responsible for their correctness, or futility. There is, certainly, something unaccountable, to persons of common observation, in the facts, both as to timber, plants, and animals; and, for this reason, they were, at first, denied. It is only to preserve the *practical* force of them from being lost in controversy about causes, that I have troubled the society. If I had considered the case merely personal, I should not have deemed it of sufficient importance to notice. Yet I am charged by some Furnisher, in the employ of the Review-Maker (who, cursorily and acetosely, glides through our first volume) with "impiety" and "unphilosophical absurdity;" and sentiments are attributed to me, which I never held;—*to wit*,—that "new and spontaneous productions are brought into *existence*, by *a new order of things*." If this *scribe* means an "order" not warranted by Scripture, and the opinions of wise and good men; I acknowledge, or believe in, no such new or old, "order of things."

The arrogance and fastidious prejudices of many of the tyro writers of articles in British periodical publi-

cations (when either persons or things,* in this country, are the subjects) are so common; that they excite in me no keen feelings of resentment. Although in themselves stingless, I regret, that the causticities of such writers are sometimes mischievous, when they fall in the way of those, who have not magnanimity to despise such hackneyed malevolence; which is unequalled by any thing, but the ridiculous, gross, and "shameless," falsehoods, of their "coadjutors,"—the jaundiced *Tourists*, who haunt, and flit through, our country.

It has been only defensively, that I have mentioned the race of animals who feed on the products of calumny. They will not be extinct, while human nature retains its present condition. On their account, I should be ashamed of casting the least reflection on the country to which they belong. Equally unjust would it be, with censure thrown on one individual for the opinions of another. The wandering part of this race, prove my allegation, that the propensity to change locality (not

* The *pious* and *philosophical* gall of the writer in the Eclectic Review, is roused by the unoffending *Schuylkill bridge*. With his usual candour, he misapplies the friendly testimony of that worthy and intelligent *English engineer*,—Mr. Weston; who writes, as to the *western pier*,—built of solid masonry, whereof it contains 6178 perches, in a coffer-dam, on a bare rock, without footing for very many of the piles, in 41 feet water; in the tide water of a river subject to frequent floods,—"it will afford you matter of well founded triumph, when I tell you, that you have accomplished an undertaking unrivalled by any thing of the kind that Europe can boast of."—He stiles these expressions of his *respectable countryman*,—"American Vanity"!!!!

always for good purposes) exists strongly in man. *De Azara*, in his travels in *South America*, furnishes proofs of the facts, as to changes of plants. I may and do believe his facts; but I utterly reject his opinions, as to local, multiplied, and recent acts of *Creation*.

The unaccountable results of *chymical affinities*, or the properties of the *loadstone*, are not new creations. *Forest trees* planted, or grown from *nuts* or *acorns*, where growths of the same species had perished, will not long thrive. Change of locality is essential in renewals of *orchards* and nurseries of *fruit trees;* as I can shew from incontestable facts. The causes must be sought for in original, and not new, creation. My whole argument (be it strong or weak) as to animals, is founded on change of locality; and not new creation. I do not rely on anamolous instances; but on a general current *of facts*.

Yours very truly,

RICHARD PETERS.

DR. JAMES MEASE,
Secretary Philad. Agric. Society.

☞ Some communications in foreign languages are reluctlantly omitted, for want of translations.

Anonymous papers cannot be inserted, agreeably to the design of the Society. Every person should be responsible, for the facts and opinions he communicates. The Society claim no praise, and wish to incur no censure, from the publication of such facts or opinions. This remark is made with no particular allusion; but for the information of future correspondents.

APPENDIX.

SELECTIONS.

Observing that some of the papers introduced into this volume indicate a strong and laudable anxiety in their authors to have the hedging system introduced if they only knew how to proceed, and which plant or plants are best adapted to the purpose. In order to direct their exertions with certainty, so that they may proceed without danger of disappointment, I have taken the liberty of presenting for insertion, the following small tract, which was presented to me by the author who is himself an honorary member of this society.

Mr. Main has fully, proved by real experiment, that one of our native thorns is greatly preferable for hedges, to the English white thorn; that hedges can be raised in this country in shorter time, by two years, and at a great deal less expense than in England. Knowing as I do, that it is Mr. Mains wish, as well as his interest to do every thing to promote this elegant and useful improvement in the country, I expect he will pardon this freedom which I have taken without his knowledge.

J. LANG.

The Philadelphia society for promoting agriculture.

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IRREGULAR PAGINATION

DIRECTIONS, &c.

Directions for the Transplantation and Management of Young Thorn or other Hedge Plants, preparative to their being set in Hedges: with some practical observations on the method of Plain Hedging. By Thomas Main, District of Columbia.

TRANSPORTATION OF THE PLANTS.

Such as are intended for a distant carriage will be packed in boxes, the price of which will be added to the charge. The seedling plants being commonly destitute of lateral twigs are naturally well adapted to lie in small compass; ten or fifteen thousand may conveniently be deposited in a box, such as any labouring man can lift with ease. The largest seedlings are, however, in a favourable season, of a size much superior to this calculation, never the less always well adapted to be laid in little room.

WHEN A BOX OF PLANTS COMES TO HAND

They are to be managed according to the state of the weather, or the season of the year in which they arrive, the length of time they have continued in a state of confinement, and their apparent condition being also taken into consideration.

IN OPEN WEATHER.

When the box arrives it is to be immediately opened and the plants taken out, but if late in the day it would be as well to defer it until the next morning; when being carefully separated from the stuffing, they are to be laid regularly in small parcels of about fifty or a hundred, with their roots all one way. Each of these parcels are then to be washed, by plunging them up and down, or from side to side, in a vessel of water to refresh them, and to clear away any filth they may have contracted during their confinement. They are then to be laid in a trench formed in some secure and convenient place for this purpose, being spread therein, pretty thin, in a sloping position, and covered all over with mould, except so much of their tops as just to shew where they are.

If, however, the season for planting them be at hand, they may be returned into the box after they are washed, laying a little of the stuffing over them, and the lid being shut to prevent injury from rats or mice, let the box be placed on the floor of a cellar, where it may remain until conveniency serves to have them planted. But if the proper season for planting is yet at a distance, and the ground happens to be extremely wet when the box arrives, it may, with its contents, be lodged in the cellar until the soil is sufficiently dry to have the plants deposited in the ground as above directed. And if at such early season a sudden frost should detain them in the cellar for a considerable period they will suffer no injury thereby, provided the box is well secured from vermin.

IN FROSTY WEATHER.

Should a box of plants come to hand when the earth is shut up by the frost or covered with snow, it is immediately to be placed in a cellar, and to remain there until the frost is over, or the snow is gone, and the ground in a fit condition to have them trenched. If there is reason to suspect, from the intensity of the cold, that the frost has penetrated to the plants, the box must not be opened until the mild warmth of the cellar has had time to dissolve the frosty particles; as handling the plants in that state might prove extremely injurious.

A sound discretion must therefore be exercised in such a case, and some days suffered to elapse before even curiosity itself is permitted to look into the box. Neither must it be subjected to any sort of extra heat, but left to the influence of the cellar alone, or to the return of open weather, to effect a thaw, at which period the plants are to be treated as above described.

A BOX OF PLANTS LONG DETAINED BY THE WAY.

If from some accidental circumstance this should happen to be the case, and the spring be pretty far advanced when the box comes to hand, the plants must be taken out, separated from the stuffing and examined; if they are found to be still alive, they may probably be recovered, although in a sickly state, by proper management. To this effect they are to be totally immersed in clear soft water, the coolest that can be obtained. They are then to be washed out clean, and particularly

inspected, and any of them that may appear absolutely dead are to be picked out and thrown aside. The residue are again to be laid in a change of the same cool water, and to remain entirely covered therewith for a few hours in a cool shady place. The plants are then to be taken out and the water thrown away, a fresh change being substituted in its place; they are now to be set with their roots only therein, and so slack together that the air may circulate freely among the stems: as many vessels being provided as may be necessary for this purpose. In the course of two or three days, shifting the water twice or three times a day, the plants will be sufficiently refreshed, and may then be planted out in the nursery as hereafter directed.

In our wintry climates, the best season for packing up plants that are to be transmitted to a remote distance, is when the sap is in its most inert state, or shortly after the fall of the leaf. Purchasers who are so situated, will therefore please to send their orders in the autumn, that measures may be taken to have their plants packed up before the setting in of severe frost.

Plants that have a long journey to encounter, will always be packed in moss, if it possibly can be obtained: when this cannot be had, oak leaves of the last fall, a little moistened, will be substituted. Such as have only a few days journey require no stuffing whatever, but will do very well tied up in a mat or other convenient wrapper. A box however is always the safest vehicle, as it most effectually prevents the plants from suffering by the weather or being injured by the carelessness of the carrier. Every person of common ingenuity will be able to supply whatever other manage-

ment accidental circumstances may render necessary, remembering always that a small degree of moisture, more or less according to the state of the atmosphere, is necessary at all times for the preservation and health of the plants, while they remain out of the earth.

NURSERY FOR THE PLANTS.

The soil most fit for a nursery to the young plants of the haw-thorn, is a free, rich, deep black loam, that has previously been in a cultivated state, rather inclined to moist than dry, rather situate at the bottom than the top of a height, rather on the flat summit than on the declivity of a hill, and where such a soil and situation cannot be had, that which comes nearest to this description ought to be preferred. A soil that would suit for cabbages, and in a similar state of preparation as would answer well for that vegetable, will also answer for the most part of such plants as are used in hedging. It will, however, be of great advantage to have the piece of ground appropriated for this purpose, digged from fifteen to eighteen inches deep ; if the soil will not admit of more than twelve inches in depth it may do, but less than that would be too shallow to produce fine thriving plants. If the state of the soil should render it necessary, it must be turned up rough or trenched by the spade in the beginning of winter, in order that it may be mellowed by the frost, and also that it may be clean from the remains of former productions, and work free and easy when it comes to be turned over, levelled and dressed in the spring.

A piece of ground about twenty-one yards square will be sufficient for the transplantation of ten thousand plants, set in rows about fourteen inches wide one row from another, and three inches apart from plant to plant in the row.

The appropriate piece of ground being well secured from the intrusion of cattle, the work of planting is to be set about as early in the spring as possible, having regard however to the state of the weather, and the condition of the ground ; for it is much more injurious to dig and dress the soil when too wet, than to have the plants put in when the mould is rather inclining to dry. The effects of a dry mould can in part be obviated by dipping the plants in water at the time of setting ; but to spade, rake, plant and tread upon a soil surcharged with moisture is often of very bad consequences. But although the earliest season is to be embraced for this business that the nature and situation of things will admit of, yet so long as the hawthorn buds, in that part of the country where the work is to be done, are not yet opened, the planting will be in good time, and if the cions have been buried in a northern exposure this will retard the sap a little, and afford more time, to wait for a favourable opportunity.

When the soil is in a suitable condition to work well with the spade, and break easily under the rake, the opportunity of a mild calm day must be taken to begin the work. The ground is then to be neatly spaded, breaking the clods and levelling it properly as the workmen proceed. So soon as three or four feet in width is digged, that portion is to be raked smooth, and the planting immediately to commence, that the mould

may be fresh and pliable, in which condition it will the more aptly close about and embrace the roots of the plants. As many planters as are to be employed in setting the plants, having provided themselves each with a dibble or setting stick for the purpose, about eight inches long, with a short handle naturally formed at a proper angle and sharpened to such a convenient point as experience will soon direct, a garden line is to be stretched one foot within the verge of the raked ground, for the first row.

So many plants as it may be expected the labourers can put in before they go to eat, being taken out of the deposit, their roots trimmed by a careful hand to about six or seven inches long, and placed in a tub of water near at hand, the planters are to take from thence small parcels, containing from twenty-five to fifty at a time, successively; as they are planted these are to be held together in the left hand, and one of them being placed between the thumb and fore finger of the same, its root is to be put into the hole made by the dibble and held to a proper depth, the mould is then to be closed thereto by a smart insertion of the dibble conveying a small portion of soil perpendicular to embrace it, another flat stroke is applied by the same to fill up the opening and thus with three motions of the dibble, judiciously applied, the plants are successively planted and fixed upright in their place, each workman being careful to plant just so near the line as not to touch it, and also not to double up the roots when putting them in which would be extremely injurious to the future growth of the plants, observing always to keep a regular distance in setting them, and

to have the root always so deep in the ground that the yellow part, or wind and weather mark, may be at least an inch under the surface. Each labourer having planted *his own share*, is immediately after to fasten that portion firmly in the ground, by placing a foot on each side of the row, and shuffling with impressive and short movements to the end of that portion which he hath planted. On the proper fastening of the plants success in a great measure will depend; it is therefore to be regarded with particular attention. The line is then to be moved about fourteen inches forward and the planting continued, while the digging and raking are also to be carried on at the same time, particularly when any considerable number of cions are to be planted, as a few hours wind and sun might reduce the surface mould into a dry crumbling state, which would not only be disconvenient for the planters, but might prove hurtful to the plants, not closing so well about their roots to exclude the air as when newly turned up and retaining some degree of natural moisture.

The smaller the plants, the more susceptible they are of injury; such therefore must be managed with the greatest care, and never be much exposed, when they are out of the earth to drying or frosty winds, but guarded therefrom as much as possible. These must also be planted on a surface more exactly smoothed by the rake, and their delicate roots neatly trimmed, and correctly inserted into the soil; for if these were left any way loose in planting, a few days or perhaps a few hours of high withering winds would risk their destruction.

It is also necessary here to observe, that plants left long immersed in stale unchanged water, particularly if it is in any degree warmed by the heat of the weather, may be injured thereby, being exposed to an insipient putrid fermentation.

WATERING THE PLANTS.

After they are planted this will seldom be requisite, except where they have been long detained by the way; in which case, after they have been refreshed by immersion in repeated changes of cool soft water on their arrival, as has been already described, observe that in planting them the place of every sixth row is to be left vacant, for the purpose of freely passing therein with the water-pot. A parcel of forked stakes, about eighteen inches or two feet long, being provided, sharpened at the butt end and stuck into the ground along each side of every bed, at the distance of eight or ten feet, a line of poles being laid from fork to fork on both sides, so as conveniently to support a quantity of leafy boughs spread over the whole to screen the beds from the sun, and to impede the current of air, which particularly in the time of windy weather would be severe upon sickly plants. The shade and daily watering may be continued for several weeks, or until the plants shew by their vigorous appearance that they are evidently out of danger, the watering may then be discontinued, and the shade removed by degrees, which the gradual shrinking of its dead leaves will contribute to effect, taking the opportunity of cloudy weather to remove it altogether.

Or should the proprietor, from a laudable motive of having large sized and excellent plants, be willing to incur this trouble and expense, the plants may be watered for a few weeks at first, although they have been planted at the proper season, and are no ways sickly. In the time of dry weather, when this watering will only be wanted, the water must not be sparingly used when once begun; for if an inch or a little better of the surface merely is wetted, the plants in place of benefit, will be injured thereby; as the soil farther down at their feeding fibres will still continue dry where moisture is most wanted, and that at the top will either do no good or stimulate the putting out of roots too near the surface. In the time of severe drought, therefore, let the soil be thoroughly drenched, if at all, and this regularly repeated every evening while the dry weather continues. But, though in this last case the alleys, in place of every sixth row, will be wanted for the conveniency of passing to water the plants, there will be little occasion for any shade.

WEEDING.

This is an important operation, and must not be delayed at any time longer than the weeds are yet so low as to be hoed expeditiously. A small garden hoe is best for this purpose, the weeder being careful to walk in the row not yet weeded, for his tread would tend to re-plant some of the weeds were he to follow after the hoe with his feet in the same row. The weeds among the stems of the plants are at the same time to be attentively pulled up by hand. The number of times which this operation is necessary in the course of the season depending upon

upon the state of the weather, can only be determined by the appearance of the weeds

TAKING UP THE PLANTS.

If, after the fall of the leaf, they are judged to be of a proper size to plant in hedges, they are to be dug up with a strong spade, the workmen being careful to obtain with every plant a proper quantum of root, such as will evidently be sufficient to nourish it. The plants will be probably of different sizes, and it will therefore be necessary to have them separated into three or four different sorts as they are taken up, and if there are some that do not yet appear of a size fit for hedging, these are to be placed by themselves and trenched apart until the next spring, when they are again to be planted in the nursery. If the plants do not appear generally to be large enough for immediate hedging; though a sufficient number to begin upon could be culled out from among the rest, these only may be taken up and the residue suffered to remain in the rows another year, fastening any of them that may happen to be loosened in taking up the others, by pressing down the earth about their roots with the feet. It will be hard to describe in an intelligible manner, the right size for hedging, as this depends not altogether upon the height that a plant may have attained, but also upon its strength and apparently healthy condition, not forgetting to take the size and number of its roots also into the estimate. Each of the different assorted sizes of the plants are to be trenched by themselves, and are to be carefully spread pretty thin in the trench in a sloping position, and the roots well covered with mould, and also half way up the

stems, mixing the earth therewith so as to exclude the air. Each row successively is to be managed in this manner, so as their roots may remain no longer exposed to the sun and air than what is necessary to have them assorted.

The sudden setting in of the winter, soon after the fall of the leaf, seldom leaves much opportunity to plant hedges before the spring; but when such seasons occur, they ought eagerly to be embraced, particularly if the nature of the soil is dry where the hedge is intended to be planted. When this is the design, the plants need not be laid in the earth, but deposited in a cellar until some thousands are in readiness for planting. It would not be prudent, however, to have a large number in such situation at once, as at this season of the year the weather might suddenly change to frost, and prevent their being planted. The haw-thorn is a plant that begins to vegetate among the earliest in the spring: therefore when a great number is on hand, it is always indispensibly necessary to begin taking them up as soon as possible, as it is a slow and tedious piece of business, and a great deal of time is consumed in the operation. But when the number of plants is not great, the taking them up may with propriety be deferred until spring; when as soon as the weather will permit, they may be got ready for hedging.

A DESCRIPTION OF THE METHOD OF PLAIN HEDGING.

A row of suitable shrubs or trees, planted at a proper distance from each other, on the plain cultivated surface

of the ground, in order to form a fence, is what here is meant by plain hedging, to distinguish it from the common method used in Britain called hedge and ditch.*

Plain hedging is, in its aspect, somewhat similar to a drilled row of Indian corn, and the culture and cleaning from weeds is equally simple in the one as in the other. The effect of a judicious cultivation is also of parallel efficacy in both cases, allowing for the slower growth of the perennial hedge, when compared with the rapid progress of the annual corn. There is no artificial elevation of the earth contemplated in this method, and where an embankment is brought into the scheme, by way of assistance to the temporary fence, it is to stand exterior to the hedge, which is set in the usual upright position inside, where it is as susceptible of cultivation as if there was no ditching in the case.

A row of hedge plants, projecting almost horizontally from the face of a bank elevated over their roots, can be cultivated or assisted in their growth no other way after planting but by hand weeding; and in the pensile position in which the young cions are placed, the effects of dry weather would prove fatal to the health, if not to the life of the plants, in such a climate as this, the first severe

* Those who are curious to understand the manner of conducting this the old way of hedging, will find in Mr. Bernard M'Mahon's American Gardener's Callender," a clear and excellent description thereof, with much other useful information in this art, as well as in the various departments of horticulture, &c. That valuable book has lately been published in Philadelphia, and in my opinion is well deserving of public patronage.

drought, that might happen, if the soil was naturally inclining to dry, more especially where the face of the bank might be fronting either the meridian or the three o'clock sun. A great deal more might be said as to the ditching method not being generally adapted for the United States: but those who have any doubts concerning the matter, and are desirous of being satisfied whether the way of plain hedging, or that of hedge and ditch is preferable, can have it determined by experiment, and after trying both they can judge for themselves which is the best.

In a rich, flat, humid soil, not very susceptible of injury to the plants from dry weather, or damage to the ditch by heavy rains or severe frosts, it is probable that the hedge and ditch method of fencing may be suitable. The nature of such soils renders ditching much easier, when free of roots, than in a strong heavy clay, or a soil interspersed with stones, made up of bedded flints, or rendered almost impervious underneath by layers of cemented gravel. In such flat, soft grounds, independent of the notion of hedging, a large deep ditch will often be wanted to drain the land, and therefore this expense cannot with propriety be made an objection against the hedge and ditch mode of forming live fences. Whenever hedging comes into general repute, it is reasonable to expect there will be sufficient ingenuity found among the husbandmen in the various parts of the country, to discover what methods are best adapted for their several local situations and circumstances, and also, what other aids can be introduced into practice, will naturally from time to time become manifest to the attentive observer.

TEMPORARY FENCES.

As the method of plain hedging will always require some protective defence, to guard the young quicks from cattle for several years after they are planted, it will be necessary to say something here concerning these. Where a field, intended to be inclosed by a hedge, is already furnished with a fence of rails, all that is then necessary is to have this temporary fence placed at a proper distance from the line where the hedge is intended to be set; this distance ought to leave a space so wide as to permit a breadth of five feet along the side of the hedge to be cultivated by the plough, whether with one or two horses the nature of the soil must determine. A hedge on a tolerably good soil, may always be calculated to extend its lateral twigs three or four feet on each side when full grown; it will therefore be proper in some cases, to plant at that distance from the bounden line of a public road, and rather some feet more distant from the line of a neighbour, who is not obliged to suffer another person's hedge to encroach upon his property, when he is not willing to receive a benefit from it. There must, also, be room left in this case to walk in trimming the hedge. Any person of common understanding will want no more than this hint to have such matters rightly regulated before hand, and sometimes, by permission, to have the temporary fence set a little out on the road side, or by consent, sometimes a few feet on the adjoining field of an obliging neighbour.

Where a post and rail fence is already erected upon the line, the hedge inside may be planted pretty near it if desirable; and the ground next the railing can be cultivated with the spade or the hoe when the hedge is in place, while the interior half of the hedge course can be cultivated by the plough, as hereafter described.

Where there is good land altogether without fencing, and where timber for rails cannot conveniently be obtained, a fence of wattled brush-wood, such as is common in many parts of the country, if it last for six years, will answer the purpose of a protective fence as well as any other. Where stuff fit for wattling is scarce, if the land be pretty flat, free of stones and easy to dig with the spade, a mound of earth or sod, or faced with sod, supported behind with earth, and surmounted at the top by an addition of wattling, will in any of these modes make a sufficient temporary fence for the purpose intended. Fences something similar to these are not uncommon in America, where no hedge is contemplated, and I have often beheld with regret the labour that has been expended upon them, considering their transitory nature, and reflecting that had there been a live hedge set behind immediately afterwards, it would in the course of a few years, have become a strong and permanent fence, rising as it where out of the ruins of the former. A post and rail fence of lasting materials, after protecting one hedge to sufficient strength, may be removed to defend another, and if it will bear two removals or last eighteen years, it may thus serve to protect three distinct hedges in succession.

For the purpose of aiding in the construction of temporary fences, plantations of chesnut, pine, cedar mulberry, the common locust, &c. ought to be immediately set about in parts of the country where timber is getting scarce. A very few acres of such would produce materials sufficient for assisting to enclose many hundreds with live hedges. The chesnut, mulberry and locust, would increase on their being cut down at a proper age, and their stumps would soon afterwards annually afford a portion of stakes and poles for the above purpose, selecting one here and there, which had attained the size, and letting the residue grow until another period. The young plants of all these species of trees would answer best to be first raised in a nursery, and after transplanting them there and letting them attain to the age of three years, then to plant them in the appropriated field, well cultivated before hand by the plough, and smoothed by the harrow, and the ground also afterwards cleared occasionally from weeds, by instruments of horse labour for a few years. The plants thus cultivated, would soon become fit for the purpose intended; not forgetting also to have such plantation well secured by a good fence from the depredations of cattle.

There will seldom be much occasion for any internal defence to protect the young hedges, if matters can be so managed as to have no domestic stock to pasture in the enclosed field for the two first years, and in the third and fourth year if cattle are only kept out during the spring and the beginning of summer, they will not do much injury to the hedges in the after part

of the season, as it is only when the shoots are young and tender that cattle will crop them.

PREPARATION OF THE HEDGE COURSE.

When the soil is tolerably good and clear of impediments, the track of the hedge will require no other preparation than what is commonly bestowed on the contiguous field for a crop of wheat or rye. Deep ploughing, however, will always be found beneficial and where the trench plough is known, the use of it in preparing the course will be found greatly to conduce towards the strong and rapid growth of the hedges afterwards. Nevertheless, it cannot be denied that the spade is superior to the plough, in cultivating the soil, in all cases where the different amount of expenses are not taken into the account; but in common practice, and on an extensive scale, the plough will be perfectly sufficient, assisted by a neat harrow, to do the whole work of previous preparation, considering that methods of saving time, expense and labour are always, when practicable, matters of high estimate to the American husbandman.

Where the soil in which a hedge is intended to be planted is worn out by crops, or is naturally thin, good culture and manure also sometimes ought to be employed to overcome its sterility; when this is the condition of the ground, these beneficial preparatives ought to be applied several months at least before the planting of the hedge, and if done one whole year before hand so much the better. If the soil is not brought into a condition of being capable of producing strong weeds of

some sort or other, it will not be able to support a stout and vigorous hedge.

When an intended hedge-course chances to cross over any spaces of barren land, these are to be made equally fertile with the generality of the soil, if practicable. Such being frequently very differently constituted, will require a peculiar preparation, as the nature of each may seem to demand. If broken rocks or stones should come in the way, they must obviously be cleared out to a sufficient depth, and their places supplied with good mould. And if such spaces are composed of an earth unwholesome or pernicious to vegetation, a trench must be dug in the direction of the hedge course, as far as is requisite, of six or eight feet wide, and some other soil, the best that can be obtained near at hand, substituted in place of the bad; in short, the sagacity of any farmer will be able in such cases to determine how to proceed. All such accidental impediments however, are to be considered in due time, and measures taken to overcome them before the hedge is planted, that it may thrive equally and be uniformly strong throughout. The temporary fencing and the preparation of the hedge course being duly considered, while the young plants are yet growing in the nursery, when the hedge comes to be planted every thing will be in an orderly train, and it will suffer no damage or detriment from an improvident conduct at the beginning. After all, in most cases the old fences being sufficient to last a few years, and the soil where the hedge is intended to stand, being in an ordinary state of clean cultivation, nothing else will be necessary, but to plough the hedge-course, harrow it smooth, run a deep furrow

straight along the middle thereof, in the manner hereafter described, and plant the hedge.

PLANTING THE HEDGE.

If the soil is naturally dry, the most eligible season for planting a hedge thereon is immediately after the fall of the leaf, but if inclining to moisture or subject to be overflowed during the winter, the planting had better be deferred until the spring, the plants having been previously taken up and assorted, as hath already been adverted to; the immediate preparation on the same day that the planting is to commence must be conducted in the following manner.

The hedge-course having formerly been laid off in the intended direction, cultivated and prepared as hath been already described, a deep furrow is to be run by the plough in the centre thereof, returning therein as often as may be found necessary, to form it deep enough and render it clear of clods or other obstacles. This operation is to be conducted in a straight direction, by the assistance of a number of slender poles, placed in the usual mode of running lines in land surveying, and about thirty or forty yards apart from each other, but their distance must be regulated by the length of the garden line intended to be used in planting the hedge. The poles having been thrown down by the plough, are again to be set up in the trench, after it is made, to see if it is exactly straight, and shew if any farther correction is necessary. The furrow, when evidently deep enough and no crook or bend appears in its whole length, is then ready for the reception of the plants. A

parcel of neat trimmed corn-stalks, provided for the purpose, are to be laid singly, about eight or ten yards from each other across the trench to support the garden line, which is now to be stretched from the first to the second pole, observing if it is not exactly straight through its whole extent, and having it rectified accordingly, the plants are to be set exactly in the direction of the poles, the line must therefore be placed on the opposite side to that where the planters are to fix themselves when performing the work. The planting is most conveniently carried on from the left hand to the right, and when the hedge is planted upon a declivity the planters will find it easiest to have their faces toward the uphill side. A quantity of the plants having been brought to the spot, as many labourers as are employed in the business are to take a handful of them, and being distributed along the line at nearly equal distances from each other, and each one with his own handful of plants laid at his left side, one of the plants is placed upright in the trench with its roots spread in the bottom thereof, and held by the left hand at a little distance from the line; as much mould is to be drawn over the roots of the plant by the right hand as to keep it steady in its place; another plant is then to be set in the same manner about five inches from the former, or at whatever distance has been determined upon;* the

* Where hogs are permitted to go at large, the distance of the plants from each other may be from four to six inches, according to the weakness or strength of the soil; the better the soil is the wider they may be set. Where these animals

planters are thus to proceed until the length of the line allotted for each is finished through the whole, the line is then to be cautiously removed so as not to disturb the plants, and with the corn-stalks carried forward and extended betwixt the second and third poles. Some of the labourers may now continue to plant, while others are employed in filling up that portion of the trench which hath already been planted. It is most convenient for two labourers to do this with spades, throwing in the mould thereby to both sides of the hedge at once, so that the plants may not be displaced by a pressure on one side while the other is unsupported; a little practice will soon render the operation familiar to the workmen, and they will understand it better in a quarter of an hour's acquaintance, than by all that I am able to say to simplify it.

Each of the different assortments of plants are to be set contiguous without mixture in the hedge. When the ground is all of equal fertility through the whole extent of the course, it is best to begin with the largest plants; when these are done, let the next in size succeed them, and so on to the lesser sizes, if more than one or two of those in hand should be required; but if the soil is not of equal strength in different parts let the strongest and best plants be set on the weakest part of the ground. It is necessary here to observe, that no

are under restraint, there will be no occasion to set the plants so close, from six to eight inches will generally answer, and one foot will be as wide as in the best of soils, will be requisite.

more length of trench must be opened at once than can be planted in the course of the day, so that the mould may be always somewhat soft and moist, which will be of essential benefit to the new planted plants; if the whole length of a side of a field can be set in the course of a forenoon, the plants being pretty well fastened by the hand and the roots completely covered with the mould, the filling in of the whole trench may be performed by the plough, particularly if the soil is soft and clean and the surface evenly. Nevertheless, the whole of the plants are always to be fastened individually afterwards by the feet of the workmen, pressing them on each side, and also in the intervals between every two, and forcing them all to stand upright in the proper range of the hedge; after which, a little of the soil scattered among their stems, will prevent the earth from cracking, and tend to keep moisture about their roots.

If the soil, as well as the weather, should happen to be pretty dry, it will be of advantage to have a tub of water at hand to dip the roots of the plants therein, in successive parcels, immediately before they are planted. The bulk of plants that have been brought out, ought also to be covered from the influence of the weather, and sprinkled occasionally with a little water, if the condition of the roots seem so dry as to require it.

When a hedge is planted in the fall, if the plants are rather small, it will be of good consequence to draw up some mould, about four or five inches deep on each side of it, forming a ridge with the plants in the centre; this will serve to prevent them from being drawn up by

the frost, or the alternate freezing and thawing of the soil in the winter months, a circumstance very common in the middle states of the union. It is not safe, however, to place leaves or litter for this purpose along the sides of young hedges, as these afford shelter for ground squirrels and mice, which are apt to gnaw the tender roots of the hawthorn, either for food or pass-time.

After a hedge is planted, if the tops appear considerably unequal, it will be proper to give it a slight trimming with the shears, clipping off just so much as to render it evenly. Or if the plants appear disproportionately tall and slender, they may then be shortened equally, so far as may appear to be necessary to prevent their being violently agitated by the winds, or bent downward by the weight of the snow in winter.

SUPPLY OF VACANCIES.

This is a most important part of the art; for if the generality of a hedge be ever so strong, yet if there are gaps left here and there, it would be equally as bad as if a post and rail fence should be deficient in several of the pannels. These gaps or vacancies in hedging can never be so effectually remedied, as when the hedge is young. Such hedges as are planted immediately after the fall of the leaf, are to be carefully examined at the return of spring, or the first open weather that may ensue after severe frosts, to see that none of the plants have been heaved up thereby, and if so, they are to be fastened down by pressing round about them with the foot, and if any of them have accidently been destroyed or cut off near the surface, they are to be replaced

by new plants, as soon as the state of the soil and the weather will permit.

Every person who attempts to form a live fence, ought to keep these supplies in early and careful remembrance. Some fine large plants ought always to be retained in the nursery, to supply such accidental failures as may happen in the infancy of hedges. Four or five plants for every hundred in a hedge, will generally be found enough for this use. As soon as the fall of the leaf takes place, all young hedges ought to be inspected, and the supplemental plants being taken up with extraordinary care to save their roots as much as possible, are to be planted in the vacancies. Where the place of one plant only is vacant, an opening is to be made for the reception of the new one, with a grubbing hoe or narrow spade, and as this opening cannot be much extended in the direction of the hedge, it must, therefore, be opened the farther across, so as to take in a good proportion of the roots of the new plant with ease, the extreme fibres thereof having been pruned a little to prevent any occasion for doubling them, a thing which is generally inimical to the free growth of any plant whatever. The opening is then to be correctly filled up on both sides with the best mould at hand, and the plant fastened well in its place by the foot of the planter, scattering a little loose earth over the spot afterwards. Early next spring, the hedge ought again to be examined, and if any dead plant has been passed over unperceived, or if any fresh accident has happened, such are to be supplied accordingly. At the end of the first and second years, or after the fall of the leaf,

and early in the spring of these periods, this examination and supply must by no means be neglected, as upon a faithful closing up of such gaps at the proper time, depends the whole effect of hedging as a sufficient fence. When the plants in the hedge are grown large, it is very difficult to introduce a brother of their own kind amongst them, as the stranger will run more and more risque, the older the hedge is grown, of being stunted or destroyed by the contiguous plants. When from negligence or accident, any of these vacancies should happen to be left unsupplied until it is too late, the simplest and best remedy is to drive a stout seasoned stake of locust, cedar or other lasting wood, into the ground where the plant ought to have been. The length of this stake need not be more than eighteen inches or two feet, where only one plant is missing. And where the deficiency of a number hath left a wide gap, common ingenuity will be able to find out proper ways and means to mend it with stakes or rails. But a hedge with such patches, particularly if they are numerous and large, will appear very unsightly, and be a lasting monument of the mismanagement of its superintendant.

CULTIVATION OF THE YOUNG HEDGE.

Through the course of the summer it is to be cleaned from weeds as often as may appear necessary. This operation will be most expeditiously performed by horse labour; the common plough will generally do very well, and any one who has ever ploughed in a field of Indian corn, ought to know without further direction how to conduct this work to advantage. The fur-

row ought to be laid towards the hedge at the first ploughing, and when the next becomes necessary, by the growth of the weeds, the mould is to be turned outwards, being mindful then not to leave an open furrow close along side of the hedge, but to return the earth therein, by a slight scratch of the plough; or by a hand hoe, after the ploughing is finished. A small neat harrow with handles to guide it by, will not only fill up this last trench the most expeditiously, but also break the clods, help to destroy the weeds, pulverize the soil, and will in a very short period, run over a great extent of hedging. The weeds among the stems of the plants, are always, however, to be drawn out by the hand, after the horse labour is accomplished.

The hedge-course being well ploughed in the spring, a harrow of the above description will, in a light easy soil, free of stones, &c. be the best instrument to weed young hedges through the course of the summer. If the nature of the soil will not easily yield to this, a cultivator, which is a sort of flat shovel plough that runs horizontally through the surface with an equal wing on each side, and is used with a coulter, is most excellent for the purpose of weeding young hedges.

It will in some places be prudent, after every dressing of the hedge-course, to open small water-ways across it, to prevent the accumulation of the rain water, and to throw it off piecemeal into the adjacent lands. This is indispensibly necessary in hilly situations, where, in the time of heavy or long continued rains, the multitude of rills would soon gather into a torrent, or being confined in the outside furrow would shortly enlarge it to a deep ditch, and perhaps undermine the hedge.

Whether nature intended the growth of weeds as an admonition for us to stir the soil in order to destroy them, it is not material for me to inquire; but it is certain that this occasional breaking of the surface to eradicate them is of benefit to the land, and of great service in promoting the growth of such plants as are adapted for this method of cultivation, and perhaps there is no article susceptible thereof in which this beneficial effect is more apparent than it is in young hedges. On a soil abandoned to an undisturbed state of repose, with the surface hardened by the sun and wind, and become quite impervious to the benign influence of the dews or light rains; a hedge thus neglected to be cultivated in its infancy, is apt to get bark-bound at the beginning, to be almost irrecoverable by the force of cultivation afterwards, and a number of years will generally be seen to slide away before it can be brought into a thriving state: but by an early and assiduous attention continued for two, three years at first, the plants will quickly recover from the sickness occasioned by their transplantation, the weeds being carefully eradicated, and the soil kept loose and light by culture; the young plants, if the first summer's affliction hath left them in any tolerable state of health, they will the next year shoot vigorously, and soon attract the attention of the proprietor, by the lively green appearance of a handsome miniature hedge. And if this should sometimes not be quite the case in the second year, the effects

of cultivation and clean weeding will to a certainty shew themselves in the third spring.

The number of years through which this course of cultivation is to be continued, can only be ascertained by the strength of the hedge, but in general five or six years will be found sufficient. Vines, briars, sassafras, and all other insidious perennial plants, are still to be rooted out from time to time, if any of them should chance to make their appearance among hedges whether young or old.

TRIMMING OF HEDGES.

When a new planted hedge has been equalized by the shears, it will require no further trimming until it hath completed its first year's growth, at which period if it appears to be considerably unequal in height, it is to be again reduced to an evenly stature, by a slight clipping after the falling of the leaf; but if it appears nearly uniform with only a shoot here and there higher than the generality of the hedge, these tall ones alone are to be cut off. The sides of the hedge need not be trimmed at this period, and here it ought to be observed that the lateral shoots are always to be sparingly dealt with, more particularly in young hedges, as upon the extension of those nearest the bottom the closeness of the hedge will a good deal depend.

At the end of the second year the top trimming is again to be attended to, and the hedge once more reduced to an equality of height.

At the third year's trimming, the operator need not tip it off so delicately as before, but having fixed on a

determined height, according to the stature and strength of the hedge, he is to cut straight into it with the shears, so as to leave a good strong stubbage, out of which the next or fourth year's shoots are to arise. The sides of the hedge may also now be trimmed a little next the top —the bottom being still spared to favour its extension. If it has grown well, it will now be about three feet in height after it has been trimmed—in order to have a stout thick hedge, the more gradually it is permitted to rise it will ultimately prove the stronger and more equal throughout.

At the end of the fourth year the hedge may be brought into its proper shape, by a judicious management of the shears. When the top is finished, the sides are to be shorn in a sloping direction: but where neatness is only a secondary object, the breadth of the hedge towards the bottom is to be impaired as little as possible, it being always the most difficult to get the lateral twigs to extend themselves outwards, the sap naturally inclining to ascend in the upright shoots, and the shearing of the sides does not stimulate their growth as is effected on the tops by cutting them.

The main purpose of trimming hedges, that are merely intended for fences, is to bring each individual plant into an equality of strength and stature; but such as are intended for ornament as well as for use, are to be kept constantly trimmed, at least once a year. On a strong soil, when the hedge is in its fifth year, if the shoots are large and rank, it may be trimmed about the latter end of June, when it has generally terminated its annual growth. It will be much easier to cut the hedge

while the wood is tender and succulent, than when mature and hardened afterwards.

But, beauty and neatness being out of the question, it is evident that the trimming of hedges does not contribute to strengthen or enlarge the stems of the plants, as some people suppose theoretically that it ought to do; thinking that by cutting off the top of a tree, the whole quantity of nourishment conjectured to be taken in by the roots alone, will be confined to that part which is left, forcing it to increase, swell and grow accordingly. The truth is, that every leaf of a tree is an organ attracting nourishment to the plant, not only by imbibing the fluids of the atmosphere, but also by its perspiration acting as a syphon to draw a continual current of new supplies through every root. There is a harmony in all the economy of nature, and the larger and more weighty the top of a tree is, it is evident that it will require a stronger stem to support it, and when the top is cut off, what occasion is there for the stem to become enlarged?— — —

MISCELLANEOUS REMARKS.

Mankind are all disposed to take the shortest road that leads to the object of their desires, though it is frequently not the best; and it may be expected that many of those who have planted or intend to plant live hedges in this country, will be impatient to have them in perfection as soon as possible, or perhaps sooner than nature, assisted by all the efforts of art, has decreed that they should be so gratified. For the purpose of rendering half grown hedges fencible, many ingenious

contrivances will, no doubt be invented hereafter. Such ideas as have come across my imagination to favour this end, shall now be freely communicated, leaving others to add thereto at their leisure.

METHOD OF RENDERING A YOUNG HEDGE IMPERVIOUS TO BLACK CATTLE.

Our cattle being accustomed to go at large, and used to pushing their way through brakes and thickets, we can only expect to debar them by live fences, through sheer strength of the plants which compose the hedge, and if they possibly can divide it with the help of their horns, some of them will undoubtedly, at times try to force themselves through, without much regarding the spines of the common haw-thorn, which would do little more to a strong steer than to tickle his tough hide, but in order to check his progress, and keep him on the outside, or keep him in if his owner should choose to have him there confined, it will not be difficult nor expensive to assist the young hedge in the following manner.

When a hedge is four years old, let the top of it be trimmed at the proper season, to about three feet or three feet and a half from the ground, a number of neat rails, or seasoned poles, sufficient to run the whole length of the hedge being provided, these are to be laid one after the other, singly along the top, exactly in the middle thereof, their ends being lapped past each other, and tied together with a piece of hickory bark, or some such cheap and ready ligature, the stubbs of the shoots will easily support them there until the new growth secure

them in their place. The hedge being annually trimmed as usual, in two years the rails will be found enclosed in the very center of it, so that any animal of a large size that may attempt to push its way through, will find it impracticable to divide the hedge.

METHODS FOR EXCLUDING HOGS.

When the old protective fence seems to be on the decline, while the hedge has not yet attained sufficient strength or closeness to keep out pigs or hogs, that are permitted to go at large without yokes, the hedge may be strengthened to resist them by driving a short stake about two feet long in the vacancy betwixt each two of the plants; if these stakes are sufficiently durable to continue firm for two or three years, the hedge will probably at that period, be strong enough itself to keep hogs out.

Another method to effect this purpose, may be commenced when the hedge has completed its second year, or when the stems of the plants nearest the ground, have attained the size of a persons thumb, then just before the bud begins to open in the spring, let the whole hedge be cut off by a saw, to within an inch and a half of the surface; the cultivation being continued as usual, the shoots that will arise from these stubbs will run up to four, five, or six feet the first season, and will be so numerous and full of thorns, that the hedge will in a few years be completely closed at the bottom; the trimming being annually attended to as before directed under that article. But it is to be observed that these strong shoots are at first easily disjointed from the stocks, and therefore cattle of every description must

be carefully kept from them until they are out of danger.

A better than either of these can be executed when, the field enclosed, is incommoded with stones.

Having the hedge-course ploughed and harrowed level in the spring of the fourth or fifth year, the stones are to be gathered from the land, and the largest ones first laid along side of the hedge; having marked a space in width, proportioned to the quantity that can be had, or is capable of containing as many of them as are deemed sufficient; they are to be laid somewhat regular, so as to form a sort of loose pavement or diagonal wall with its upright face about fourteen inches high, bearing against the stems of the plants. The interstices among the large stones may be filled up with the smaller, so as to close every opening against the growth of weeds or perennial plants.

This will not only be an excellent barricade against swine, but will also tend to enrich the soil and promote the growth of the hedge; but it must not be attempted before the stems of the plants at the surface of the ground, have acquired the size of a stout walking cane, as the stones will harbour field mice, and other animals that would gnaw the roots of small plants but will not trouble such as are of the size mentioned.

Where stones cannot be obtained, another method may be taken to close the bottom of a hedge. After a course of flat rails, similar to those that are used in post and railing, are fixed along the inside, with their faces bearing against the hedge and raised a few inches from the surface—held in their places by small stakes or

other simple contrivances—a mound of earth is to be piled up in a sloping bank to support them—having first ploughed a narrow stripe at a little distance from the hedge course, the more easily to procure mould for the purpose.

This mould would rather be of benefit than detriment to the hedge, although if both its sides were to be banked up to any considerable height, it might kill it entirely; for there are few plants that can bear to be set much deeper in the ground than they grow naturally, but when the earth is elevated on one side only, the hedge will suffer no injury therefrom, and will thus appear planted on the side of a bank without any ditch.*

HOW NEAR TO A WOOD OR GROVE OF TALL TIMBER TREES, MAY A HEDGE BE PLANTED, SO AS NOT TO SUFFER INJURY OR HAVE ITS GROWTH IMPEDED THEREBY?

At the same proximity to such a wood as where Indian corn would thrive, a hedge also will do well, that is about the length of the trees off, from where they stand, or a little farther. There are some species of trees, however, that are uncommonly noxious to whatever other plants are introduced to their neighbourhood, particularly after they have acquired full possession of the soil, and are grown up to their complete stature. The common blackwalnut is one of these, and perhaps the lombardy poplar is also not a very innocent neighbour to a hedge. Fruit trees may be planted at such a distance from hedges, as is proportioned to their common size or altitude—but to plant any of them in the line of a hedge, is by no means advisable. Morella cherries, plumbs peaches and quinces, may be set about fifteen or twenty feet off; apples, according to the size that the different kinds attain to, may be set at the same or a little farther, and pear trees, heart cherries, &c. are all to be regulated in this respect, according to their usual ultimate height remembering at the same time, that there is a difference betwixt setting a hedge near full grown trees, and setting young trees near to full grown hedges, as in the latter case the old hedge will not be so easily injured by the youthful intruders, as if a young hedge were introduced to the neighbourhood of old trees. The persimon is a very innocent tree, and perhaps will sometime or other be found worthy of cultivating in orchards, for the value of its fruit, and the many important purposes to which it can be applied in domestic economy.

* As to the method of splashing of hedges, it is not necessary to describe it here, as it is only adapted for such as are old, ill managed, or here and there defective of plants. Any person who is curious may see a full description of splashing, illustrated with a cut, in the American edition of the "Domestic Encyclopædia," by Dr. Mease, of Philadelphia; a book that is or ought to be, in the hands of every husbandman and house-keeper in America.

WHAT SORTS OF HEDGE PLANTS ARE RAISED FOR SALE AT MAIN'S NURSERY.

That kind which I have been most in the habit of propagating for some years, is a species of the Ameri-

can haw-thorn, which, after trying several others, seems to me to be the best adapted for hedges of any of the many different kinds of that plant which are natives of this country. It is one of the several maple leaved sorts, to which I have given the name of the American hedge-thorn; any farther description is at present unnecessary, as my former customers are now in possession of it, and those who intend to purchase can soon also have an opportunity of seeing it. For this plant the foregoing directions are more particularly adapted, although with a very little difference they will suit for the most part of plants used in hedging.

THE PYRACANTHA OR EVERGREEN THORN,

Is another plant, of which a few thousands are now on hand for sale the ensuing season. It is not a native of this country, but after a trial of several years it appears to take well with the climate, and seems excellently adapted to form hedges. Being an evergreen, a hedge of it will be highly ornamental. When it comes to be about three or four years old it begins to bear fruit, and after that it is annually decorated with a profusion of its bright scarlet coloured berries, the numerous clusters of which make a splendid appearance, from the beginning of September through the greater part of the winter. It is apt to run up to long slender and flexible shoots easy to be intwined at pleasure. It freely takes root by layers, for whenever any of the twigs lean upon the ground, or are but slightly covered with the soil, they will soon send out fibres, so that a single cion of it may quickly be made to cover a surface of ten or

twenty feet wide. No plant can be more suitable to fence in a poultry yard, as not the smallest chicken will be able to get through a fence of it properly trained.

THE HONEY LOCUST.

That horrid thorn, whose stem is armed with protruded clusters of spears pointing every way to guard an orchard against the attempts of the lurking thief, is the only other kind of plant on hand at present, fit for the purpose of hedging. Although I have not yet made much progress in experimenting its capacity for this end, it has, I believe, been tried in other places, but how it answers I have nothing but conjectures to inform me. I have, however, no doubt of its eligibility to form strong and handsome hedges. Its foliage is extremely beautiful, and goes to sleep every evening, by folding the lobes of the leaves together, like the clover and many other plants related to that class, at which time the change of its appearance so suddenly effected, is amusing to the observer. Four or five thousand plants of the honey locust are now on hand for sale.

THE HOLLY

Is a plant of the first rate estimate for hedges, but I have unfortunately never been able to procure seeds of it since I commenced the nursery business in this place. It grows plentifully in many parts of the country, and will probably thrive on a soil composed of an over proportion of sand for the haw-thorn to thrive.

THE RED CEDAR

Will succeed on a very barren soil and bleak exposure, where perhaps none of the others mentioned would thrive. Hedges of it have been made in several parts of the country, and if I am rightly informed some of these are now excellent fences. Had I an opportunity I would undoubtedly try the two last named plants.

Those five species above named, are the whole that I would choose to include in the list of hedge plants, as the best adapted in my opinion for the purpose in this country. Many others, indeed, might be mentioned that are fit for ornamental hedges, and there is scarce a tree in the forest, but what its species might be impressed into the service of live fencing; but while those that are superior can as easily be obtained, why should we use such as are but indifferent?

A promiscuous assemblage of several different kinds of plants in a hedge cannot be recommended; such a heterogeneous composition will neither make a good fence nor look handsome.

Somewhat in contradiction to this rule, I last year (1806) planted a hedge in the spring, composed of the pyracantha and honey locust, set alternately about eighteen inches apart. The soil was an old field extremely poor, and quite worn out, scarcely capable of bearing grass, or the leanest species of weeds. I, therefore, scattered a little manure along the track, where the hedge was to be planted, and turned it in with the plough. After smoothing the surface a little with a hand hoe, the plants were set at the distance described, the summer was very dry and unfavourable, but contrary to expectation, both pyracantha and honey locust survived it, and are now (September, 1807,) in a very thriving condition. The intention of this mixture is to have the bottom of the hedge perfectly closed by the pyracantha, and the body of it strengthened by the honey locust; both together may be expected to present such a thorny mass of entangled resistance as will preclude all intrusion.

Perhaps if I had planted two distinct hedges, one of the pyracantha eighteen inches plant from plant, and another of the honey locust, about five feet outside of the other, also at eighteen inches apart, it might have been still better.

It is not my present intention to persuade any person into the notion of hedging, or to use any arguments for that purpose; such recommendation would come with a better grace from any other person than from one who is in the habit of raising quicks for sale, and is consequently interested in disposing of them. It may, however, be allowable for me to say, that this mode of fencing, whenever it is practised in the United States, will contribute its share to give an orderly and systematic turn to our plans of rural policy, conducive to a permanent neatness and regularity among arrangements that are commonly in a continual state of confusion and change.

It can scarcely be expected that gardeners or overseers generally will be advocates for the introduction of live fences. To look for this, would be to look for more than human nature can afford, for who would voluntarily seek additional care and trouble, with an additional

risk of blame, without any expectation of an additional recompence?

CONCLUSION.

Those who have honored this trifling performance with a perusal thus far, will be enabled thereby to judge for themselves, whether or not its contents have any claim to the attention of the American agriculturist. I have, therefore, nothing further to observe, but that the friendly countenance and approbation of intelligent, sensible and reflecting characters, will ever be esteemed and sought after, as an essential part of my reward. For the use of those only who have felt themselves interested, or curious enough to follow it this length, among whom I include all my former and future customers, this imperfect production is most respectfully dedicated by

Their humble fellow-citizen,

THOMAS MAIN.

DISTRICT OF COLUMBIA,
September 28th, 1807.

Method of stabbing Hoven Cattle, to discharge the rarified air from the stomach, when they have been overfed with moist clover grass. Communicated by Mr. W. Wallis Mason, of Goodrest Lodge, near Warwick. From Trans. Soc. Arts, London, vol. 26.

Gentlemen,

I beg leave to lay before you a trocar and canula for the relief of cattle, when gorged or hoven. Since I have introduced it, it has been used with the greatest success, having, in every instance tried, been proved a safe, easy and effectual remedy. I consider it will not be necessary for me to detail the dangerous consequences arising from cattle being hoven, as it is well known, that the public are annually deprived of numbers of valuable cattle by this disorder. I am inclined to offer it as an instrument superior to that for which the society granted a premium in the year 1796;* as I

* The instrument for which the Society of Arts rewarded the inventor by a premium of fifty guineas in 1796, was not a tube, but consisted of a cane six feet long, having a knob at one end, which was to be pushed down the throat of the animal into the paunch, and thus to give free passage to the air extricated by the clover. The flexible tube mentioned was invented by Dr. Monro of Edinburgh in 1795, and consisted of iron wire twisted round a rod of polished iron; the wire after being taken off the rod, is to be covered with leather.

J. M.

am of opinion, that flexible tubes may be forced down the passage which conducts to the lungs, by which most dangerous consequences would ensue. An instance of this kind occurred last year in this neighbourhood, when intending to force the passage of the paunch, and occasioned the loss of the animal.

Neither the farmer or bailiff can be expected when going the rounds of the farm, to carry with him at all times an instrument so large as one of the flexible tubes; even if he had it, he could not make use of it without the assistance of a second person, and the disorder would be fatal in most instances before such assistance could be procured.

I considered that the trocar and canula commonly used by surgeons, might be employed to advantage for the relief of hoven cattle. I have employed the instrument to answer better the purpose here intended of penetrating the tense hides of cattle; and such alteration materially facilitates the operation.

The method of applying it is, to penetrate with the trocar and canula through the hide of the beast to the paunch on the near side, about six inches* from the back bone, at an equal distance from the last rib, and from the hip bone: then to withdraw the trocar, and to leave the canula in the wound until the air which the paunch contained has escaped. The canula may then be taken out, and the wound covered with a plaister of common

* A member found that six inches was too small a distance, as the kidney of a cow was injured when stabbed at that distance from the back bone by a knife. J. M.

pitch spread on brown paper,* about the size of a crown piece. All the danger incidental to the common mode of stabbing with the knife is effectually prevented by the canula being left in the incision when the trocar is withdrawn.

The small expense of the instrument, its portability, the ease with which it can be used by an individual, its safety and efficacy in use, as it has not in any instance failed of complete success, will, I hope, be sufficiently evident to recommend it to the attention of the society. A great saving would arise to the owners of cattle, and to the country at large, from a general adoption of its use.

A feeding ox will thrive as well after the operation as if it had never been affected by the disorder. Cows in calf are in no danger from its use. It has been found particularly beneficial in preserving rearing calves and young cattle, when afflicted with this disorder, which had heretofore been fatal to great numbers of them.

I beg leave to add certificates of a few of those gentlemen who have witnessed the utility of this method, and whose recommendations have stimulated me to submit it to the society, in hopes that by their liberal patronage it may be rendered more generally beneficial to the public.

I have the honor, &c.

W. Wallis Mason.

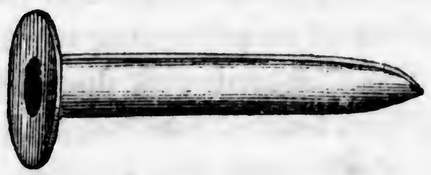
Certificates from the following gentlemen testified, that they had experienced the efficacy of Mr. Mason's

* Leather or coarse linen would answer better.

J. M.

trocar; had proved the safety of the operation, and the instantaneous relief which it had never failed to produce without leaving any blemish or dangerous consequence from its application.

JOHN FORD NAISH, *Leek Wooton.*
THOMAS BRYAN, *Warwick.*
WILLIAM ORAM, *Warwick.*
WILLIAM LEDBROOKE, *North End.*
RICHARD CATTLE, *Milverton.*



REFERENCE TO THE CUT.

The blade of the trocar is of steel, fixed into a wooden handle. The shape of the blade of the trocar is oval. The canula or sheath is an oval tube, which exactly fits the blade of the trocar; the concave circular plate fixed at the end of the canula, forming a hilt, to prevent the instrument from giving too deep a wound when used: the end of the canula is worked down to a sharp edge, that it may not obstruct the passage of the instrument.

FROM THE HAMPSHIRE GAZETTE.

On planting Corn. By Joseph Lyman.

Referred to, page 46 of Memoirs.

Mr. Butler,

Having heard of the advantages to be derived from planting and cultivating Indian corn in a manner different from the one commonly practised, I determined, for my own satisfaction to make the experiment. I chose a field which the year before was in grass, and was turned up and cultivated without any manure for raising potatoes. When these were gathered, and the vines cleared off, the ground was ploughed. Last spring I ordered 45 sack loads of manure, as are contained in the body of a cart, to be carried on. The manure was composted, made chiefly from potatoe tops, corn stalks, and other vegetables; and might perhaps be nearly equal to 30 loads of common barn yard manure. When spread equally over the field, it was ploughed again, and fitted by the seed harrow for planting. I then divided the field into three equal parts. One third was planted in hills two feet distant each way, three grains in a hill. One third was planted at the common distance of three and a half feet between the hills, three grains in a hill. The other third was planted as our farmers usually plant, three and a half feet between the rows and six feet between the hills, about five or six grains in a hill. The seed was poor, so that more than one in three grains failed. My corn came up very unevenly, some hills hav-

ing one, and some three stalks in a hill. After the first hoeing, a small handful of unleached ashes was put round each hill through the field. In those portions of the field where the corn was planted thick, I directed the suckers when about eight or ten inches long, to be plucked off, so as to leave no part of the shoot on the original stalk; then the dirt was drawn about to prevent bleeding. The corn was suckered three times. When the shoots began to appear above the second joint they were left for bearing. The third of the field planted in the usual mode was left to nature, and was not suckered. The two feet corn was cultivated by hand hoeing. In the other parts, the harrow or the plough was used twice; the two last hoeings were plain. The rankness and tenderness of the stalks would not admit of the plough. The eighteen inch and common way planting were well hilled: the two feet corn would not allow hilling, but in a slight manner. The corn planted in the usual mode suffered much more by falling to the ground than either of the other lands; owing, I suppose, to the feebleness of the secondary stalks or suckers: the two feet corn stood the most firm and erect.

On the night succeeding the 31st of August, my field was so situated as to receive manifest injury from the frost. At harvest I was careful to make an exact measurement of the corn upon each portion of the field, by a half bushel, then examined by the town standard. The field I measured by the surveyor's chain; it contained one hundred and eighty rods of ground. The produce on each part was as follows, viz.

60 rods planted square, two feet distance, yielded 39 bushels and 11 quarts, which is 105 bushels to the acre.

Sixty rods planted at the usual distance of rows and 18 inches between the hills, yielded thirty-six bushels and twenty-seven quarts, which is 98 bushels and one peck to the acre.

Sixty rods planted in the common mode yielded thirty-two bushels, which is eighty-five bushels and one-third per acre.

The whole field yielded 108 bushels and one peck nearly, which is, upon an average, 96 bushels and one peck per acre.

The quality of the corn in the two first modes of planting was nearly similar. In both instances they clearly excelled the corn planted in the common mode. In this statement I make no account of the soft and poor corn, which upon the whole field amounted to six or eight bushels of ears. Every farmer for himself, will estimate the shrinkage between harvest and market season. This will not alter the proportion of each piece of ground. I am persuaded that the lucrative mode of planting is to plant three grains, and if they come up well, to pluck up the poorest stalk after the first hoeing, leaving two for growth. Then you may expect, if the land be prepared, to have two full ears upon each stalk. It will be inquired, what is the proportion of labour upon each mode of cultivating? Here I cannot be so exact as I have been in my other calculations. Yet I was not inattentive to this part of the experiment, I found little difference in any part of the labour, excepting in planting, ashing, hoeing and suckering. I think the following estimate cannot be far out of the way. The common mode of planting, until we finish hoeing, I should

call five days work on an acre: the eighteen inch, eleven days; and the two feet corn, fifteen days on an acre. The two feet corn, besides exceeding in quality, has nearly twenty bushels more than the common planting: the greater expense is ten days work, or ten bushels of corn, by which means we make a clear saving of ten bushels per acre.

In the eighteen inch planting, we make a saving of seven bushels over the common mode. The two feet planting exceeds the eighteen inch after allowing for labour, three bushels.

In these new modes of planting by suckering your corn, you turn the strength of your soil from the production of barren stalks to the production of solid grain: your lands yield greater profit: your work is brought into a narrow compass, and you have your other fields without any loss, left in a state to recruit, and be prepared for a future abundant harvest. The experiment was made upon easy land, free from stone. I conjectured that the advantages would be still greater upon hard strong land, where the common mode of cultivation is more expensive.

JOSEPH LYMAN.

Hatfield, Nov. 1, 1796.

AGRICULTURAL INQUIRIES

ON

PLAISTER OF PARIS.

ADVERTISEMENT.

THE Society requested me to arrange, for republication in their memoirs, the contents of my little compilation on PLAISTER OF PARIS, in 1797. I have endeavoured to collect from various quarters of our country a series of facts occurring since that period. I should have combined them with, or engrafted them on, the facts then drawn together; and thus have formed a compendious account of all we now know on the subject. But although I have been favoured by a few to whom I had written, I have been generally unsuccessful. I shall persevere in my endeavours; and either wait 'till my object is fully attained, or communicate, as I receive them, the results of my inquiries.

There is a most unfortunate indisposition in our fellow citizens, to reduce to writing the necessary information required on agricultural subjects. Some are too busy, and some too indolent. Dread of criticism operates on some; and false and reprehensible diffidence on others. There are few landholders who cultivate their own soil (as do most in this country) who cannot express their knowledge of facts sufficiently clear in writing, on a subject to which they are more competent than literary theorists. No farmer is remote from some well educated neighbour, who can write down and communicate the facts recited to him. It is therefore the more to be lamented that any want of information on practical hus-

bandry, should retard the improvement this kind of knowledge would promote. The few who engage in the task of diffusing agricultural knowledge and intelligence, are not assisted or supported as they merit. They must, however, be content with doing all the circumstances and difficulties they encounter permit. They must be satisfied with their own consciousness of the purity and usefulness of the motives which actuate them. The ribaldry of small critics (if any there be) who nibble at modes of expression not objects of literary scrutiny; and the feeble sarcasms of those who, instead of encouraging, attribute laudable exertions to communicate and diffuse agricultural information to personal vanity; or to a rage for what such puny (or, in their own phraseology, *poney*) censors call "riding their hobby horse," must be disregarded. The numbers of such hypercritics must be so small, and their patriotism so much below the freezing point, that they should not excite even the momentary attention of those who wish to promote the prosperity of their country. One valuable improvement introduced, or made more generally known, through their agency, far over balances a thousand verbal criticisms, and sour or fanciful strictures. I say not this with any reference to myself (for I have not the presumption to claim any right to exemptions, or peculiar attention to my wishes or requests) but to impress on others, of more capacity but little active zeal, a disposition to render to their country the service it requires. This is not only called for, from those who can furnish the necessary facts, but it is more imperatively demanded from those whose talents, and literary, as well as other capabilities, can turn facts to the most profitable account.

Men of sense and liberal tempers, do not look for elegance of diction, or classical arrangement, in agricultural communications; in which those succeed the best who can confine themselves to plain colloquial language; though this on every subject cannot be done. When readers with well turned minds even meet with language, or phraseology, not usually within the comprehension of common farmers, they forgive, though they may not approve. I have my share of toleration to require on this, and every other, account. Those who seek for better entertainment than circumstances will admit, or as *Sancho* would say, "want white bread, where only wholesome brown is to be had," often risk, or lose, comfortable accommodation.

I travelled, in early life, on my way to a county court, with a city acquaintance; who, being a smell-fungus and fault-finder, had generally an unpleasant journey. At a country tavern (where I always found plenty of the best fare *to be expected in such places*, though not served up, or sat out, in a style of elegant arrangement) *he* called for *capillaire*,* and *orgeade*;† to relish his beverage, in a hot August-day. He became petulant, when he was told, that no such things were either kept or known in the house. The landlady, who had really put her best foot foremost, to entertain us, was disgusted; and returned his testiness with compound interest. She concluded a highly seasoned and flippant philippick, by requiring us "to go where we had a right to expect *city dainties;* or ride on 'till we learned that good country provisions were better than *leckerbissleinen*,"—*kickshaws*,—which she supposed what he had called for to

* *Capillaire.*—Syrup of the herb maiden-hair.
† *Orgeade.*—Sugared barley-water.

be. She was a plain, but smart German. I pacified her, in her own language, with all due submission to existing circumstances, essential for one who did not wish to lose a substantial dinner, because *capillaire* and *orgeade* could not be obtained. And if such unnecessary sirrups should have been found, out of their place, *I should have been the last* entitled to object to a dinner on that account. I soon restored her good humor, by some fortunate pleasantries, at the merited expence of my morose companion; who experienced their profitable effects, without understanding them. If he *had* understood them, he would only have sat me down for a witling. By these I succeeded in convincing her, that *I*, who had been a frequent and contented guest at the house, ought not to suffer, or the house lose advantages, because *she* had been teased and affronted by *ein lecker phantast*;—in English—an overnice pretender to delicacy of taste.

I have deemed it best (under the failure of my attempts fully to comply with the wishes of the society) to re-publish the AGRICULTURAL INQUIRIES, from the first impression, *verbatim*. This has created the necessity of adding notes, both to the text and former notes. The little book is out of print; and much sought for, though not now of so much importance as it was thought to be at the time of its publication; when the subject was not so generally known. All my experience since, confirms the information then promulgated. If I cannot now materially add to it, I have no cause to reproach myself with any omissions of endeavours so to do.

RICHARD PETERS.

Belmont, 10*th September*, 1810.

AGRICULTURAL INQUIRIES

ON

PLAISTER OF PARIS.

ALSO

FACTS, OBSERVATIONS

AND

CONJECTURES ON THAT SUBSTANCE,

WHEN APPLIED AS MANURE.

COLLECTED, CHIEFLY FROM THE PRACTICE OF FARMERS IN PENNSYLVANIA, AND PUBLISHED AS MUCH WITH A VIEW TO INVITE, AS TO GIVE INFORMATION.

WITH SOME ADDITIONAL NOTES;

AND MORE RECENT FACTS AND INFORMATION.

BY RICHARD PETERS.

PHILADELPHIA:

RE-PRINTED BY JANE AITKEN, No. 71,
NORTH THIRD STREET.

1810.

INQUIRIES ON PLAISTER.

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* Plaister is so irregular in its phenomena, that it often unaccountably fails, or surprisingly succeeds. Many attribute this to the times of sowing ; according to the age,—increase or decrease, of the *moon*. Whatever success or failure they experience, at any particular times of the *moon's* phases, or situations, a general rule is formed, and fixes faith. The *plaister* must be sown by the *almanack ;* because, in its irregular operations, it happened to succeed, at a favourite time. So of all crops, of every species ; bleeding, and surgical operations on animals, setting of fences, and planting of trees. Mr. *Roberts* risks, with those who are governed by such "*chimeras*," the credit of his other facts, by denying the orthodoxy of this indulgence in *lunology*.

A worthy old German told me, in the presence, and much to the edification of several of his neighbours, who were great believers in the *moon*, that our *elections* never went right, at the wrong time of the *moon*. I asked him, if he meant the full and change? He replied,—no. The sign should be in the *head and heart* "*das haupt und hertz ;*" "und nicht in *den bauch, und die schaam ; oder die arme und hande :*" and not in the belly, or the secrets, or the arms and hands. Whether my old friend (who shewed how the signs governing those parts, influenced the actions and conduct of men) spoke seriously, or sarcastically, it would be as well (if we had the option) to leave the *moon* and the *signs*, in possession of agricultural influences, exclusively. In other matters, neither the signs, nor the sympathies, could be adjusted to general satisfaction. This shews, however, to what lengths vagaries are carried.

R. P.

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Thanks to correspondents.

FAC-SIMILE of General Washington's hand writing; and sketches of his private character.

Richard Peters.

***

To GEORGE WASHINGTON, President of the United States.

Sir,

THE following collection, on the subject of the agricultural properties and uses of the gypsum, having been undertaken by me at your desire, I have thought there was a propriety in presenting it to you. However unimportant other parts may be, those which contain practical results, I flatter myself will be useful.

I have had frequent occasions of knowing, that the encouragement of agricultural improvement and information, is among the favourite wishes of your heart. It is on this account, and not with a design to give it an undue importance, by placing it under your notice, that I have been induced to inscribe to you this publication.

It is peculiary consolatory, when we can draw any portion of our comfort from our misfortunes. Your retirement from public life will afford you leisure and opportunities, by your patronage and example, to promote the interests of agriculture. Some compensation will be thereby afforded us for the loss we shall sustain, by your resigning the helm at which you have so long, so wisely, and so safely, steered our political barque.

Long may uninterrupted health, that first of blessings, enable you to enjoy the splendid evening of a life, so much devoted to your country, as to have been but little dedicated to yourself.—And that you may be as happy as you have been eminently instrumental in making millions of your fellow-citizens, is my sincere and ardent prayer.

I have the honor to be,

With the most true and respectful esteem,

Your obedient servant,

RICHARD PETERS.

January 3*d*, 1797.

PREFACE.

IT is to be lamented that it falls to the lot of an individual to risque the publication of the following sheets, in which the agricultural part of the community are more immediately, though not solely, interested. An ineffectual attempt has been made to establish a state society of agriculture, whose useful and agreeable employment it should be to invite and promulgate communications, stimulate experiments, and cherish and reward, with honourable testimonies at least, the ingenious and industrious cultivator. An application was made to a former legislature of the state, for an act of incorporation of such a society, and a plan therewith suggested. But no steps have yet been taken in the business. It is to regret, and not to censure, that I mention the circumstance. It is difficult, if not impracticable, to produce conviction in the minds of the generality of farmers, that persons who have not been educated or manually employed in farming, can give much useful information in, or effectual energies to, agriculture. And yet

the greatest improvements in husbandry, have been either suggested, or made, by those who were not professional farmers. If pecuniary assistance should be required out of the public funds, it should be afforded. *A cent* expended, with propriety, to aid and reward genius and industry, in pursuing agricultural experiments and researches, will add an *eagle* to the public stock. This is applying nourishment to the root of the public prosperity.

Were it without example, it would be surprising that legislatures, consisting for the most part of farmers, have done so little for the encouragement of a profession, which is calculated, above all others, to produce additions to the common mass of property, by *creating* countless supplies, drawn from the earth.

In England, the establishment of *a Board of Agriculture*, under the patronage and pecuniary encouragement of the legislature, is recent, but its advantages are incalculable.

In France, *agriculture* is accounted, as it really is in all countries, the basis of public and private wealth and prosperity. Its patronage and encouragement are placed among the first objects of public attention; and radically interwoven with the principles and system of their national policy and government. Perhaps the period is not distant

when the public mind here will be turned to this subject. Nothing will then be wanting towards the accomplishment of every thing wished for, by the friends to this important and invaluable art. They have received the highest gratification, and must conceive the strongest hopes, by observing this subject recommended to the attention of Congress by the President, who has constantly mingled with his other patriotic solicitudes, an unabating desire to forward agricultural inquiry and improvement.

I began this collection of facts, &c. on plaister of Paris, with no intention to make it public. I found, in the course of my inquiries, much agreement as to general results, among my agricultural acquaintances and friends. I now think the collection I have made, will be so beneficial, that I cannot resist the desire I feel to make an effort, towards rendering the knowledge of this valuable substance, more generally diffused. I hazard the disapprobation of the gentlemen (to whom I return my sincere thanks) who have favoured me with their communications; as I have not asked their permission to lay them before the public. But I trust they will pardon me, from the motive inducing me to take the liberty I have used. I have also a wish to see, whether agricultural publications will meet with a favourable reception.

I had intended to form, from my own experience, assisted by the materials I could obtain from others, an essay, in which all the knowledge we have of the agricultural uses of the gypsum might be concisely promulgated. But, on a subject in which practice is the surest guide, *facts*, vouched by men of practical knowledge exhibited in their own words, seemed to me best calculated to promote truth, remove prejudice, and to excite and encourage inquiry and exertion.

I had answered the queries on this subject for private information, chiefly from the knowledge I had gained, in a long course of practical attention to the uses and effects of the gyps; and I find, since receiving the communications from my friends, that their experience and mine, in general, agrees.

As to opinions and conjectures though they may not at first be solid, they may possibly lead to farther discoveries. In statements of agricultural facts, made to those who are to judge of the merit of experiments or practice, it is perhaps right to avoid opinions and speculations. But in the present publication, I have thought it proper to throw out opinions, and even slight conjectures. My view is to draw forth better opinions, and to set scientific men to thinking on the subject.

Terms are used in the following account of the gypsum, without nice attention to their force; as it is difficult more accurately to express our present ideas. The plaister, is, for instance, called a *stimulant*, a *manure*. Some substances are said to *make a good footing for the plaister*, that it *wants something to feed on*, &c. When we know more about it, we can establish a more appropriate and correct phraseology.

Several to whom I have applied for information have not favoured me with it, from a disinclination, I presume, to throwing their thoughts on paper. This discouraged me from extending my correspondence. But I believe I have obtained the most material facts. Those who have answered the queries, occupy land of every variety of description, so as to comprehend the whole range of the different soils on which the plaister is used.

I shall be truly grateful, if any of those who have been in the practice of applying the plaister, will supply omissions, and rectify mistakes.

I indulge a hope that men of chemical and philosophical knowledge, will be induced farther to examine and analyze this powerful substance, with a view more accurately to discover its agricultural properties, and the causes of its operation on plants. The farmer, when taught by their dis-

coveries and experiments, will be enabled to render this manure still more valuable, by the most judicious modes of application. It will then be *felt* by the cultivators of our soil, that *science* essentially promotes their interests and happiness. A practical conviction of the advantages derived from it, will urge them to afford to literary establishments, and men of useful learning, the public and individual support they so justly merit,

RICHARD PETERS.

January 3d, 1797.

INQUIRIES, FACTS,

OBSERVATIONS AND CONJECTURES,

ON

PLAISTER OF PARIS.

Letter of Richard Peters, and Answers to Queries on Plaister of Paris, by Mr. William West, of Darby Township, Delaware County.

Sir,

THE gpysum, or plaister of Paris, according to a late analysis of its component parts, as declared in an English work, is said to be compounded of a mineral acid, and a calcareous earth; the first an enemy, the second friendly to vegetation. According as the one or the other prevails, it is said to be good or bad. It is said there, to operate on virgin soils with good effect, but not on grounds which have been long under cultivation, and especially those that have *been limed.* The result of your experience is requested on this particular point: my observations do not support this assertion.

Make any miscellaneous remarks, founded on your experience, though they may not be immediately applicable to the queries I take the liberty to send to you.

Head your observations with each of the queries to which they respectfully apply, and be pleased to favour me with them as soon as your leisure will permit.

I am, with sincere esteem,

Your obedient servant,

RICHARD PETERS.

Mr. W. WEST.

Query 1. How long have you used the plaister?

Answer. About eleven years, without disappointment in its effects.

Query 2. What state was your land in when you began the use of it?

Answer. My land chiefly when I began to apply it, though naturally of the first quality, had been nearly a century under bad management, and tired down. I ploughed up about five or six acres, and dressed it with a rich earth about old buildings that grass had grown over, and rotted it down in itself, and applied about thirty loads to the acre, sowed it with winter barley, the spring following with clover, the next spring with plaister of Paris; its product in grass was allowed to be equal to any that had any where been seen. I mowed it two summers, and have grazed it ever since, and the sod is now in good perfection. I redressed it last summer with plaister, and its stimulation very good; the sod is green grass, white clover with a mixture of red. This piece with a number of others, laid down in grass with different kinds of manure, and plaistered, will now feed as many cattle as acres, and from the

effect of their droppings may be kept up continually. I have continued the application of plaister every year from my first using of it to the present, and its most beneficial use is on grass, if rightly managed on the previous dressing of other manure and its preparation; all which will require a system in itself to describe at large.

Query 3. What quantity per acre have you generally used?

Answer. The quantity of plaister per acre, four and a half bushels, the redressing about three bushels; but I would not recommend a second application when land has been mowed five or six years, without a light dressing of other manure.

Query 4. What soils are the most proper for this manure?

Answer. The soils most proper for the plaister are warm, kind loamy ones; land that is generaly deemed good wheat land; that will sink the water quick in winter, not too level, and land moderately hilly. Land that takes lime well, will the plaister.

Query 5. Have you repeated the application of it with or without ploughing?—at what intervals, and with what effect?

Answer. The repeated application of it has a good effect, as I have mentioned above. It follows lime equal to any manure.

Query 6. In consequence do you find that it renders the earth sterile after its useful effects are gone?

Answer. It does create something of sterility in five or six years by mowing; then it may, as above mentioned, be lightly dressed by dung or compost; about

IRREGULAR PAGINATION

twelve loads to the acre, will make a new footing for the plaister. This quantity will promote a wheat crop.

Query 7. To what products can it be best applied? grain and what kinds? grasses and what kinds?

Answer. It is best adapted to grass and every kind of summer grain.

Query 8. When is the best time to scatter it?

Answer. The time to strew it is in the spring, when vegetation is fairly abroad.

Query 9. What is the greatest product per acre of grass, &c. you have known by the means of plaister?

Answer. Respecting the quantity of grass per acre, I have answered above.

Query 10. Have you ever used it with other manure, and what?—and the effects if any superior to the plaister alone?

Query 11. Is there any difference between the European and American plaister?

Answer 10 *and* 11. I answer in one: have never used it with other manure; thought inexpedient.*

As to its durability, the product for five years, mowed twice each year, and the third plaistered, will I believe be more than can be produced from dung, without restriction of quantity.

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* I am sorry I have not had the pleasure of a conversation with Mr. West since he was so obliging as to communicate his answers. I was obscure in stating to him the 10th query. I meant not a mixture of the gyps with the dung, and a cotemporaneous application. He has in his answer to the 6th query met my ideas on the subject.

R. P.

It is not very agreeable to fully express my experience on agriculture, for fear the verity of it might be called in question; but a visit from Judge Peters at my farm, would be agreeable, when conversation would add something more.

WILLIAM WEST.

May 26*th*, 1796.

I have often since conversed with that most worthy and much lamented agriculturist Mr. *West*. I never could prevail on him to write more on this, or any other subject. He would evade, or what was more in character, at once refuse all my importunities. Mr. Sellers and Mr. West, having been among the first with whom I communicated on the subject of the plaister, and when they were unbelievers, I took occasion to address my queries to them and was highly gratified by their conviction of its efficacy and the results of their experience.

Mr. West did not begin the use of plaister, until many years after its being known here; and used by all who could be prevailed on to believe in it. But he soon recovered his lost time. His fortunate plan of top-dressings with a kind of creation of manure, made from materials on his own farm, and such as are generally overlooked and neglected, succeeded most wonderfully as auxiliary to plaister. It seemed to operate in connexion with his composts, with all grasses on his fields; and to set general rules at defiance.

R. P.

September 1810.

Letter from Robert Frazer, Esq. of West-Chester, containing an account of the use of Plaister of Paris, by Col. John Hannum, of Chester county.

Sir,

I have received no information from those into whose hands I put your queries in answer thereto, except from Col. John Hannum, to whom I delivered a copy a few days ago. Your anxiety to receive information on the subject, urges me to the most speedy transmission of such as I have obtained. Whether it will prove satisfactory or not, you will be best able to judge.

Query 1. How long have you used plaister?

Answer. Twelve years.

Query 2. What state or condition was your land in when you began the use of it?

Answer. I have used it on virgin soils, and upon old land; sometimes very poor; sometimes good strong land; sometimes indifferent.

Query 3. What quantity per acre have you generally used.

Answer. From *one* to *five* bushels.

Query 4. What soils are most proper for this manure?

Answer. High ground and sandy soils.

Query 5. Have you repeated the application of it with or without ploughing? at what intervals, and with what effect?

Answer. Frequently both, with and without ploughing, and generally with very great effect.

Query 6. In consequence do you find that it renders the earth sterile after its useful effects are gone?

Answer. I have not yet found its useful effects to have ceased; possibly owing to my mode of using it generally, which is, of applying one bushel per acre each year.

Query 7. To what products can it be best applied? grain and what kinds? grasses and what kinds?

Answer. Beneficially to the production of wheat, rye, barley, Indian corn, buckwheat, peas of all kinds, potatoes, cabbage, clover, and all other grasses common amongst us.

Query 8. When is the best time to scatter it?

Answer. From the first of March, if the ground is clear of frost, to the first of May.

Query 9. What is the greatest product per acre of grass, &c. you have known by the means of plaister?

Answer. I have in some instances by means of plaister, taken three tuns of hay from land really poor; but such cases are not common.

Query 10. Have you ever used it with other manure, and what?—and the effects, if any superior to the plaister alone?

Answer. Yes; the land will in less time be much more productive. I have not found my land in good heart, in less than three years with plaister only.

Query 11. Is there any difference between the European and American plaister?

Answer. I have used both; have sowed them on the same kind of ground, on the same day, and have observed no difference.

N. B. I have raised from two acres of ground, plaistered three succesive years previously to sowing, without any other manure, 927 pounds of clean dressed or

swingled flax, the land being at the first sowing of the plaister very poor.

If I receive any further information, it shall be forthwith forwarded to you.

I have the honor to be

Your very humble servant,

R. FRAZER.

West-Chester, May 30th, 1796.

RICHARD PETERS, Esq.

On *wheat*, rye, and other *grasses* than *clover*, I have never succeeded by *direct* applications of plaister. Barley and oats rolled in plaister have been much benefited. But after clover *plaistered* had occupied the field for its usual time, wheat, rye, or any culmiferous crop, have highly profited by the amelioration of the soil.

R. P.

September, 1810.

Answers to Queries on Plaister of Paris, by Mr. Philip Price, Jun. of East Bradford, Chester County.

Agreeably to thy request, I have endeavoured, according to the best of my recollection, to answer the queries thou wast pleased to forward to me, which I have endeavoured to do in as explicit a manner as possible, and hope any incorrectness will be excused, as it is done in a hasty manner.

Query 1. How long have you used the plaister?

Answer. Ten years on two different farms; four years on the first, and the present is the sixth year on the second.

Query 2. What state was your land in when you began the use of it?

Answer. The first farm I lived on had been much reduced and worn out, but was considerably improved with lime and stable manure, for a few years before I went on it, and began to make use of the plaister. The farm which I live on at present was also the greater part much reduced and worn, and but a small part either limed or manured.

Query 3. What quantity per acre have you generally used?

Answer. I have seldom used more than two bushels per acre in one season, but generally one and one and a half bushels per acre, which I find sufficient if repeated yearly whilst in clover.

Query 4. What soils are most proper for this manure?

Answer. By the experiments and observations which I have made, I find a high, warm, dry, gravelly or loamy soil, to be much the best; clay, cold or low lying land, is seldom favourable for it. I have known some low lying land which was dry and loamy agree with it, but not near equal to the high.

Query 5. Have you repeated the application of it with or without ploughing—at what intervals, and with what effect?*

Answer. I have frequently repeated the use of it both with and without ploughing. I sowed a field with it five years ago, which had some little appearance of both red and white clover, but had never been sown with any seed, upon which I put one and a half bushel of plaister per acre. I pastured the field, and although the season was very dry, it produced a great quantity of good pasture sufficient to keep about one and an half head per acre. The second year I sowed one bushel more per acre. The season being more wet, it was bet-

* The effects of the plaister detailed in this answer are invariably proved by all experience, before and since this publication. When I mentioned the operative principle of the plaister—i. e. the *sulphuric acid* (first set free itself, and then) decomposing substances in the earth, and thereby furnishing their food to plants and attracting moisture, the idea was either new, or little known. But it accounts for all the phænomena of plaister. Old fields are uniformly found to evidence the strongest effects. In them, decayed roots, and vegetable putrefying or putrefied matter, is in the greatest abundance.

R. P.

September, 1810.

ter than the first, The third year it was not plaistered, but continued good. It was ploughed in the fall of that year, which was very tough ploughing, but done by two horses. The next spring I planted it with Indian corn, and put half a bushel plaister per acre on, which yielded upwards of fifty bushels per acre. The year following I sowed the same field with barley, having manured a part of it with barn yard manure the fall before I sowed the barley, I then intended to have sown the field with wheat, but the clover (without any seed being sown) coming up and making so beautiful an appearance, determined me to let it stand for a crop, which now looks to be the best crop I ever had of grass, being a mixture of red and white clover, with some blue grass. I sowed one bushel more plaister last spring per acre. I could mention several other experiments which I made, that are similar, on land of the same quality; as this field and two more which I had, were in pretty good heart before I began to use the plaister.

In the spring of the year 1792, I fenced off a piece of about four acres, being a part of a large field that was much reduced, washed into deep gullies in many parts, and had been totally neglected for many years. The appearance was so disagreeable that I put no value on it when I purchased the place, though the field contained near fifty acres. The above said piece of four acres I folded my cattle on at nights, which were between thirty and forty in number, for near three months, and sowed it with wheat. The spring following, I sowed it with clover seed and one bushel of plaister per acre; soon after the seed came up, the clover grew strong that season. I applied one bushel more plaister per acre the

the next spring, and then mowed two good crops a year for two years; then ploughed the clover down, after the last mowing the second year, and sowed it with wheat on one ploughing, which now is a good crop standing on the ground. I may here remark, that I have not apprehended the plaister to be of any benefit to a crop of wheat, when first sowed, upon it; but after having been in with clover, it is in a very fine state for a crop of wheat and seldom fails producing a good one, if not left to lay so long as other grass, to get too strong for the wheat.

Another experiment I made in part of the field last mentioned, on about eight acres that was extremely impoverished, and thrown out of cultivation for a number of years. It lay very high and dry. I ploughed it in the fall of the year 1791, and let it lay until the next season, when I ploughed it again and sowed it with buckwheat, which was a light crop, notwithstanding a favourable season, not yielding above seven or eight bushels per acre. The next spring I sowed it with oats and clover seed, and then had five bushels of plaister sowed over the whole piece; the crop of oats better than I expected and the clover grew so that it came out in bloom that season. The two next seasons I sowed it with plaister, the first with but three bushels on the whole where it appeared to be the weakest, the second year with one bushel per acre, and mowed the clover both years two crops which were good, and the clover appearing to stand well. I have sowed it again with one bushel per acre, which now promises me another good crop I have put no other manure whatever upon it, and it is now

worth ten times what it was before I plaistered it, the face of the soil appearing to be entirely changed, and is admired by all who have heretofore known it, the plaister having had the effect they have known upon it. This has encouraged me to treat all the field in the same manner, which has been nearly done to the same good effect.

Query 6. In consequence do you find that it renders the earth sterile after its useful effects are gone?*

Answer. I have never yet found it to have any bad effect upon any land that I have put it on, and as I repeat the use of the plaister as often as I sow with clover, I have not experienced the beneficial effects to be gone; but I find that in pasture land that has lain for four or five years or more, it occasions a stiff sward to plough; put when well ploughed and pulverised, it is as light and mellow as it has been before the plaister was put on: and I am fully of opinion, were farmers to be careful to mow all they possibly can where the plaister is used, the great addition they would thereby gain to their usual proportion of manure would render it almost impossible ever to have that effect, as mowing is much

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* The bugbear exhaustion has been long found to be a mere phantom. I have not a field which is not the better for repetitions of plaister. It is known that my applications were not only the earliest, but for many years on the most extensive scale. I continue to use the gyps freely and in large quantities.

R. P.

September, 1810.

less injurious to the soil; by not being trodden the clover will stand good longer and will not get into that tough state above described. It should never lay more than two years until ploughed for a crop of wheat, and I would recommend the following rotation of crops, as requiring the least ploughing or labour, and which I am endeavouring to practice. *First year* Indian corn, potatoes and pumpkins; *second year* barley, when it should be manured and plaistered, after being sown with clover; *third year* clover, to be mowed and given to the stock, or made into hay; *fourth year* to be used in the same manner, and ploughed after the second crop is mowed for wheat; *fifth year* wheat. The two years it is in clover, it should be plaistered with one bushel per acre, if high and loamy land, but more if inclined to be heavy.

If five fields are farmed in this manner, the produce will be amply sufficient to manure one of them every year. I have somewhat deviated from the query, to shew the little danger their is to be apprehended from a proper management, where the plaister is used.

Query 7. To what products can it be best applied?—grain and what kinds?—grasses and what kinds?

Answer. I have found it more beneficially applied to Indian corn than any other grain, having never failed to have a good effect wherever I have applied it, except in two instances: one of them was in a field about a third

part of which *had buckwheat in the preceding year;** I left a row of corn unplaistered, which run across the fresh broke up land and the buckwheat ground: in the latter I could perceive no effect whatever that the plaister had on it, being a very light crop; in the fresh broke up land the crop was very good, and more than double the quantity where it was plaistered than in the row that was not. The other instance was in a *fine mellow rich piece of land*, that had been well manured the year before; from which I had taken a good crop of potatoes and pumpkins. I left three rows unplaistered, but could perceive no difference whatever between them and the others, where I had sowed at the rate of two bushels per acre. The piece was sowed the spring following with barley and clover seed, and *the plaister that had been put upon the corn without any advantage, had a great effect upon the clover*, which was much better than where the three rows were omitted. This piece had been *well limed* before the pumpkins and potatoes were planted. The effects of the plaister here, as well as in many other instances which I have known where it has

* Many farmers are of opinion, that Indian corn never does well immediately after buckwheat. I have never considered buckwheat an exhauster, as it is a bastard legume and a good covering crop. R. P.

I have changed my opinion, by more attentively pursuing experiments on buckwheat. I think it is a great exhauster, when permitted to ripen its seed.

R. P.

September, 1810.

been applied to Indian corn* *in mellow land and had no effect*, has been mysterious to me in its operations. I have never had it to have any effect (when first applied) on any other grain except buckwheat, when sowed on fresh broke up land.

I have found the plaister to be of the most advantage to red clover of any grass, but I believe will be helpful to any grasses whatever that are sown in such land as I have described in answering the 4th Query.

I believe it will also be useful to any kinds of grain put in after clover.

Query 8. When is the best time to scatter it?

Answer. I have found it to be the most advantage to clover to sow it with a small quantity *soon after it comes up*, and to repeat it again *as soon as vegetation takes place*,† which I believe to be the most proper time for any grasses;—or Indian corn, immediately after the first harrowing and moulding.

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* I have had frequent instances of its failure in mellow land, and supposed that by tilth and exposure the putrefying vegetable substances had been exhausted; but here was dung to supply their place.—If Mr. Price means *dung* where he says it "had been well *manured* the year before," it is an instance of the whimsical effects of the gyps.

R. P.

† This is an excellent expedient to prevent the effects of drought, and give a stimulus to the tender plant in its first efforts when it is often destroyed. It also falls in with the ideas of those who think it best to sow it when vegetation takes place. Mr. Price's method secures both chances.

R. P.

Query 9. What is the greatest product per acre of grass, &c. you have known by the means of plaister?

Answer. I cannot answer this query with certainty, having never weighed any. But by computation from land that has been manured before it was plaistered, I have had from two crops of clover about four and a half tuns per acre; and from poor unmanured land, that I should not suppose would have produced, half a tun, I have had frequently one and an half, and perhaps two tuns. I propose trying the experiment, by weighing a small proportion of a piece I have plaistered, and another sowed with clover at the same time, along side, and treated every way in the same manner, except the plaistering. The plaistered, I think, will produce at the rate of two tuns; and the other I do not believe will produce at the rate of five hundred weight per acre.

Query 10. Have you ever used it with other manure, and what?—and the effect if any superior to the plaister alone?

Answer. I have never found any kind of manure to be of any advantage to strengthen the plaister. I have put it on after lime and dung frequently, and have always found the greatest difference in the effect, where it has been put on entirely alone, both on clover and Indian corn. *Where the manure has been put the crop has been the greatest*, but their operations I believe to be entirely independent of each other.*

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* Whether my idea of the *sulphuric acid* being the active agent, in the gyps was original, or adopted, I cannot tell; nor do I claim merit on such accidental thoughts. But since my conjec-

Query 11. Is there any difference between the American and European plaister?

Answer. Not in their effects upon grass or grain that I have ever been able to discover, as I have used them both on the same field. The European is the easiest manufactured, which makes it preferred; but the American is found to make the strongest cement, and is generally used for that purpose.

PHILIP PRICE, Jun.

17*th of* 6*th Month.* 1796.

RICHARD PETERS, Esq. *Philadelphia.*

I have heard of none who have been more remarkably successful in the plaister system than Mr. West, and Mr. Price. They have brought old worn out lands to an astonishing degree of fertility and profit, by combining the plaister with other manures. The gyps was, however, the principal agent. As to results in general, my experience and theirs agree; but I think I have proved that dung and plaister mutually assist each other. It appears by Mr. Price's statement, that they do not *disagree* together; for he states, that "*where the manure has been put, the crop has been the greatest.*"

R. P.

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tural *then*, but now well known, principle of operation has been tested by long experience, there remain no doubts of the mutual assistance afforded by dung, or any other animal or vegetable putrefying or putrefied substance, and plaister.

R. P.

September, 1810.

Answers to Queries on Plaister of Paris, by General Edward Hand, near Lancaster.

Rock Ford, July 30*th*, 1796.

Dear Sir,

I sit down to answer your queries on the subject of plaister of Paris, so far as my own experience enables me; that indeed is confined, owing to the circumstance of my farm being generally managed by persons whose indolence, or prejudices proved great bars to experiment. That difficulty is now removed, and I hope hereafter to be able to conduct it on a plan more beneficial to myself, and by communicating my little experiments, to be of some use to the community.

Query 1. How long have you used the plaister?

Answer. Ten or eleven years.

Query 2. In what condition was your land when you began the use of it?

Answer. That on which I first tried the plaister was apparently exhausted by injudicious management, and produced the most scanty crops of any on my farm.

Query 3. What quantity per acre have you generally used?

Answer. Generally not less than three, or more than four bushels.

Query 4. What soils are the most proper for this manure?

Answer. My land is a sandy loam, on a lime stone of different qualities; the rock in some places so near the surface as scarcely to admit the plough.

Query 5. Have you repeated the application of it with or without ploughing?—in what manner?—at what intervals?—and with what effect?

Answer. I have repeated it the seventh year after three crops of clover, one of wheat, one of corn, and one of oats, with which clover was sown. The effect nearly the same as at first. I have this spring repeated two bushels per acre on the same ground, without ploughing, on clover which had been mowed two successive years, but my expectation was not answered.

N. B. This ground, has been twice manured with barn yard dung; once with corn, and once on the grass, since the plaister was first applied.

Query 6. Do you find that it renders the earth sterile after its useful effects are gone?

Answer. On the contrary, the lands on which I have first used the plaister, though then in the state mentioned in answer to the 2 Query, have since regularly yielded excellent crops of grass, grain, potatoes, corn &c. part of which never has had any other manure, at least for twelve years.

Query 7. To what products can it be best applied?—grain, and what kinds?—grasses, and what kinds?

Answer. I have found considerable advantage from the plaister sown with oats in very small quantity, *i. e.* as much as would adhere to the wet seed. Applied to corn in the same way, it has an admirable effect; indeed with me, equal to three or four times the quantity sown on the corn after it comes up.

I have sown it with barley and clover, at the rate of three bushels per acre at different times. The clover was always very fine, but I cannot say that the barley

was any time benefited, and I have reason to believe, that it would have been as good a crop without the plaister. I have never tried it on any other small grain.

Grasses. I have generally used it on red clover. I have also sown it on mixed grass, as white clover, blue grass and timothy, always to good effect.

Query 8. What is the best time to scatter it?

Answer. I generally sow it in April, but have also applied it in June, after mowing the first crop; the effect nearly the same.

Query 9. What is the greatest product per acre you have known by the means of plaister?

Answer. I once mowed eighteen tuns from five acres: the clover was sown with oats on old ground; the oats was no more than a middling crop. Fifteen bushels of plaister were sown after raking the stubble in April, and the grass cut the June following.

I have frequently got two and a half tuns per acre, never less than one and a half tuns; the second crop is generally one third less. I have indeed heard of much more abundant crops of grass; but as I believe you do not admit hear say evidence, I shall not trouble you with it.

Query 10. Have you ever used it in connexion with other manures, and what?—does it agree with lime? and what effect has a connexion with other manures produced superior to the plaister alone?

Answer. I have not used plaister in immediate connexion with other manures till this spring. On about an acre manured with barn yard dung, which was planted with potatoes last year without dung, was sown barley and clover, and immediately after three bushels of N. S. plaister. I this spring also sowed barley and clo-

ver on three acres, which had been manured with the same kind of dung, and planted with corn last year.—Three bushels of N. S. plaister per acre immediately followed the barley. The clover in both, looks extremely well, and may be cut this year if I chuse it. If a preference can be given, it must be to the acre in potatoes last year, and manured this spring. They were both ploughed late last fall after taking in the crops. Lime I have not tried. I this spring sowed plaister on two pieces of mixed grass, and a few days after wood ashes at the rate of ten or twelve bushels to the acre, as near as I can guess, was sown on one of them; they have been cut and fed green; that on which the ashes were sown has been twice cut, the other but once, and at this moment they are both equally fit to cut again. Except in this instance of the ashes, I have never had more grass from lands previously manured for other crops, than from those which had not,* although an equal proportion of plaister and grass seed had been sowed on each.†

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* The result of the dung applied on the barley ground, cannot be known until next year.

† Plaister with *lime*, and with *ashes*, never fails to agree. There is an instance apparently contradictory in the memoirs, 2 volume, page 105. I never doubt facts asserted by respectable men. But I suppose the *grasses* were not of the *trefoil* tribe. On other grasses, the plaister has little, if any, effect, as repeated experience proves. I therefore think that the plaister and ashes were not at variance; but the *grasses* were not of the kind liable to be benefited by the plaister.

R. P.

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Query 11. Its duration?

Answer. In one instance I mowed the same ground four years successively after four bushels per acre of plaister had been applied, but I find that blue grass generally begins to appear the third year; therefore I wish to mow or pasture the ground two years only, and then plough again.

Query 12. Is there any difference as to useful effects, between the American and European plaister?

Answer. I cannot yet tell. The trials made with the American plaister on barley and clover this spring, mentioned in answer to the tenth query, are my first essays; the prevalent report of its bad quality, prevented my making an earlier trial. At present the effect of the American plaister appears equal to any thing that might be expected from the European.

I wish it had been in my power to have given fuller answers to the questions you have been pleased to ask me. In doing it I have confined myself to simple facts, avoiding comments and matters of opinion, supposing them foreign to your design.

With much respect,

I have the honour to be,

Dear Sir,

Your very humble servant,

EDWARD HAND.

The Hon. RICHARD PETERS *Esq.*

Note, on General Hand's Letter.

I am sorry that one so capable, as well from professional knowledge on chemical subjects, as opportunities of acquiring and making agricultural observations, has avoided comments and matters of opinion. Having hazarded these myself, I should the more gratefully have received them from those more capable of forming just opinions and well founded conjectures.

R. P.

Answers to Queries on Plaister of Paris, by Mr. John Curwen, of Upper Merion, Montgomery County.

W. Hill, August 10th, 1796.

Dear Sir,

Inclosed are my answers to your queries, agreeably to your request.

If the plaister is compounded of a mineral acid and calcareous earth, it may be suspected that both have a share in its effects; for it can hardly be supposed that such can be produced from it less than a bushel of calcareous earth to an acre; and may it not be presumed that some active substances, which in large quantities are poison to vegetation, may, in very small ones be friendly to it; or may not the compound have qualities, not found in any of its parts?

If in England it has no effect on grounds which have been long under cultivation, and especially those which have been limed, America may boast of superior advantages. My answer to the 10th Query shews the result of my experience on that point.

Query 1. How long have you used the plaister?

Answer. Ten or eleven years; at first in small quantities, but finding it beneficial, have used a good deal for several years past.

Query 2. What state was the land in when you began to use it?

Answer. Generally on limed and dunged land which had been much exhausted previous to this by bad tillage without manure.

Query 3. What quantity per acre have you generally used?

Answer. I began with six bushels, but gradually lessened the quantity to one; and finding the immediate effect not materially (if at all) different, now put on only one, and repeat it every other or third year, supposing more produce is obtained from the same quantity in this way.

Query 4. What soils are the most proper for this manure?

Answer. Dry loams. I have tried it on wet clay without effect, though I have found its effects on the banks of watered meadows considerable; it does better on hilly than level land, perhaps because it is dry and lighter.

Query 5. Have you repeated the application of it with or without ploughing?—in what manner?—at what intervals, and with what effect?

Answer. I have repeated it on meadow and clover every other or third year with good effect, and sown it several times on the same land, after ploughing, without observing its effects to decline: in the last instance the land was dunged; in the former it was not.

Query 6. Do you find that it renders the earth sterile after its useful effects are gone?

Answer. No, quite the reverse; nor do I believe any kind of manure has this effect; though hard cropping of land, dressed with lime, has given rise to this opinion.*

*I was deceived in my first applications of *lime*, by being told that *lime* will spend itself as much without cropping, as with constant successions. I over cropped, without then knowing its mischief. Lime spends itself, as it is called by exhausting the vegetable matter in the earth, and nothing is more injurious than hard cropping, with lime: bad enough with any manures. I mean grain crops. R. P.

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Query 7. To what products can it be best applied?—grain and what kinds?—grasses and what kinds?

Answer. I have used it most on red clover, and know no crop which it improves so much; it does very well on white clover and mixed grasses, but not equally so as on red clover. I have tried it on Indian corn with different degrees of success. *It enlarges the plant I think more than the product of the corn.** On wheat, rye, &c. if it did any good, it was very trifling.

Query 8. When is the best time to scatter it?

Answer. This may be done at any season, but as it operates quickly, the least time is lost by putting it on when vegetation is coming on rapidly in the spring, or soon after mowing the first crop.

* I have sometimes suspected this to be the case, but have never been able exactly to ascertain the fact. In some seasons I have had very large, and in others moderately sized ears of plants, which appeared equally vigorous. The plant gets the greater part of its growth before the ears begin to set. I have supposed that its earing, well or ill, depended not so much on the plaister, as upon previous culture; and season and other circumstances at the time the ears are forming and filling. Let the ears in any *particular season* be smaller or larger than usual with plaistered corn, they are *always* better than those on rows left unplaistered in the same field.† R. P.

† My practice now is to scatter the plaister over the whole field (two bushels to the acre) and harrow it in. I also dust a little on the plants when young at the first dressing. I find the roots coming in contact, throughout the field, with the gypsum (operating on the putrefied substances, and supplying food and moisture) has much greater efficacy.

September 1810. R. P.

Query 9. What is the greatest product per acre of grass, &c. you have known by the means of plaister?

Answer. I have had clover which would have made two tuns of hay per acre the first crop, and that on ground which I am certain without plaister would not have produced one third of that quantity; the second crop nearly one tun, and reserved the third crop for seed.

Query 10. Have you ever used it with other manure, and what sorts?—or on ground previously dunged?—and the effects, if any superior to plaister alone?

Answer. I have never mixed it with manure previous to putting it on the ground, *but generally used it on ground limed or dunged (or both)* not long before, and found its effects *in a great degree proportionate to the manure in the ground* (whether limed or dunged) though on ground exhausted and never manured, the effect was considerable.*

Query 11. Is there any difference between European and American plaister?

Answer. I do not remember using any American before this year; and as I had none of the other sown at the same time, I cannot answer this query; but it had

* Nothing is better than plaister to mix with compost beds. It forwards the putrefaction, (without consuming them) of the vegetable or animal matter composing them. *Lime*, in quantities, or hot, consumes and injures. I often differed with my late friend William West on this subject. He was convinced he had begun with too much lime; and lessened the proportions. R. P.
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the desired effect, and I am inclined to think there is little or no difference.

Query 12. Its duration?

Answer. With me it has not been uniform. Whether it depends on the quantity put on, the nature of the soil, the difference in seasons, or the goodness of the plaister, I cannot say; but it will sometimes fail the second year; sometimes it will last four or five, and where it has been put on the hills of Indian corn, and afterwards mixed with the soil by ploughing, I have known its effects visible for six years, and continue the same length of time on an exhausted soil never manured.

It is no small addition to the value of plaister, that the grass lands on which it has been spread, are not near so much injured by drought as others, and that cattle love to pasture on them better.

The expence of raising red clover with plaister and a small quantity of dung, and raising it with dung alone (if bought at the common prices) may I think be estimated as one to five.

I am, Sir, your's sincerely,

JOHN CURWEN.

Answers to Queries on Plaister of Paris, by John Sellers, Esq. of Derby Township, Delaware County.

August 15th, 1796.

Dear Friend,

It would afford me much pleasure to have it in my power to communicate any observations generally useful on the subject of thine of the 19th of last month, to which the obliging thee would be an addition. The analysis thee mentions in an English work I consider as a useless inquiry, until we were able to know with the same certainty all the properties of plants, and the portions of the variety of elementary foods nescessary for the greatest promotion of vegetation. I therefore should suppose acids friendly or unfriendly, according to the quantity of the other kinds and portions of manure applied therewith, as we know a due quantity of lime is friendly, and that too much is entirely destructive to vegetation, and that a greater quantity may with safety be applied with dung than without it. The knowledge most to be depended on, is to apply such manures as from experience we find best to promote vegetation. I have thought a repetition of the same sort of manure on the same ground would not have so good an effect as a change, which perhaps may be as necessary as that of different kinds of grain, flax, potatoes, &c.

My first use of plaister was in the year 1786, on land limed about fifteen years before, and afterwards manured with dung in a moderate degree. It was at that time sown with clover on the wheat in the spring,

from which the produce in grass was very great; some judged three tuns per acre; I suppose there was certainly two and a half per acre for several crops; it however declined so that in five years their was but little clover, the old plants dying, and the new ones being overpowered or smothered with green grass. I then at seeding time broke it up and harrowed in wheat, the next spring sowed it with clover and plaister on the wheat. The clover following this operation was light in proportion to the former, perhaps owing to the roots of the green and other grass not being sufficiently killed by the one ploughing, thereby the plaister not having so good an effect on a second application as the first.

The next plaistered was with respect to having been limed and dunged, the same with the first and the continuance of large crops of grass. It was then in the spring broke up and planted with corn, and the next summer sown with barley and spring wheat; and at or about the same time with clover and plaister, which succeeded nearly equal to the first time sown with plaister.

The next second application of plaister was on the sward six years after the first plaistering. This piece of land had a dressing of rotten dung in the fall. The next summer first crop was light, the second crop better chiefly green grass and but little clover. The next spring where the dung had disappeared, and was incorporated with the soil, it was sown with about two and an half bushels of plaister per acre, which was succeeded with a middling heavy crop, nearly one half clover, I suppose brought forward by the plaister.

On some other of my fields, within reach of my barn yard, that has frequently been dunged, the plaister had

a very extraordinary effect, but has not been repeated on distant fields that never have been dunged, its effects were wonderful, considering the state they were in; one of the fields was sown with clover on the wheat and not exceeding two and an half bushels of plaister per acre, in March, 1794, on which I had upwards of forty cattle upwards of two weeks in the beginning of last May; then inclosed it for mowing, and mowed it in the latter end of June and the beginning of July last, from which I had upwards of one tun per acre. This field without the plaister or clover seed, would not have produced pasture worth inclosing. It has been under cultivation in turn near or quite one hundred years.*

Here suffer me to express my utter astonishment and inability to account in what manner so small a quantity of matter of any kind should have so wonderful a power of promoting vegetation as appears in the above cases. Thy English author speaks of virgin earth being the most agreeable to plaister, it is likely it may. Land over poor appears most certain of being improved by it. It may be observed, that all my land, and indeed all in the state, was in a virgin state as to that kind of manure.

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*Here is a strong instance of plaister on old cleared fields, without dung. Mr. Sellers's is one of the oldest settlements in the state. I very much doubt the theory of this English author especially as it respects *virgin earth*. No doubt it will operate wonderfully on new land (which does not require it) because of the vegetable matter in it, but it is on *this matter*, and not the *earth*, that it works. But see at the end, an instance where plaister had no effect on new land.

R. P.

September, 1810.

Query 1. How long have you used plaister?

Answer. I have answered it in the foregoing.

Query 2. What state or condition was your land in when you began the use of it?

Answer. Before I used the plaister my land was full of twitch, or what is called blue grass, which afforded little pasture, scarcely sufficient to fatten cattle for my own use; since the use of it for several years back, I have fattened from forty to fifty each year, besides mowing as much off the fields each year as afforded a sufficiency of hay for my team and family horses, and upwards of twenty cattle; before that my dependance for hay was from bottoms and watered banks, the hay from which was very inferior to that from the fields.

Query 3. What quantity per acre have you generally used.

Answer. For several years I used between four and five bushels per acre, but the two last years not more than two or two and an half per acre.

Query 4. What soils are most proper for this manure?

Answer. A soil too light and sandy, or clay, I think unfavourable, and that called loam, not over stiff, most favourable.*

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*I had been informed of several instances of plaister being beneficial to *clay*. But in every case I inquired into, I found the clay completely drained, by being thrown up in high ridges; and all its moisture evaporated, or drawn off. See Mr. Young's excellent mode of ameliorating clay-soils; Agricultural Memoirs, vol. 2, page 186. This not only changes the texture and nature of the soil; but adds the vegetable pabulum for *plaister*, or *lime*. Mr. *Young's* meritorious perseverance, in this new and successful experiment, has earned the thanks of all farmers of such ungrateful soils. I have seen indications of the fact, and have been informed, that the vitriolic acid of the plaister on wet clay, has thrown up a concrete (alum) on the surface, like a hoar frost.

R. P.

September 1810.

Query 5. Have you repeated the application of it with or without ploughing? at what intervals and with what effect?

Answer. I have answered above; but I am inclined to think its effects will lessen by a frequent application, but not more so than the frequent application of any other kind of manure. Perhaps the improvement of land may be something similar to that of animal improvement, which is better promoted by a change of nutriment, than by being confined to any one kind.*

Query 6. In consequence do you find that it renders the earth sterile after its useful effects are gone?

Answer. I have not observed any sterility yet to follow its use; perhaps a greater length of time may produce such appearances. For some years past my rotation of crops and times of breaking up grass, has been as followeth: I have seven fields; one with Indian corn, one in fallow that was in Indian corn the year before, one in winter grain that was a fallow the year before, four in grass. By which rotation I have always four for pasture or mowing, besides the fallow and the wheat field from harvest the remainder of the grass season.

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* Mr. Sellers was of the opinion I have often avowed on this subject. He gave me numerous instances, in his long experience, as to changes of both plants and animals; as well of individuals, as of locality and nutriment. He carried it into the change of manure; of the benefit whereof I have seen many striking and undeniable proofs. He was uncommonly observant; and one of a strong mind, not destitute of cultivation.

R. P.

September, 1810.

For several years past the Indian corn was in fields that had been plaistered four years before, which has been evidently much better by the effects of the plaister than it would have been without it.

Query 7. To what products can it be best applied? grain and what kinds? grasses and what kinds?

Answer. I think it improves any kind of grass, but more particularly red and white clover.

Query 8. When is the best time to scatter it?

Answer. I have scattered it at various times without regard to any thing but conveniency, and have not found any difference in the effect.

Query 9. What is the greatest product per acre of grass, &c. you have known by the means of plaister?

Query 10. Have you ever used it with other manure, and what?—and the effects if any superior to the plaister alone?

Answer. 9, and 10. In the foregoing.

Query 11. Is there any difference between the European and American plaister?

Answer. From the observations I have made, I prefer the American.

Although I may already have trespassed on thy patience by the length and unconnected manner of treating the subject, my desire of communicating something useful on a subject which of all temporal concerns is the most beneficial to a nation, induces me to proceed; from my own observations, a piece of ground used in the way of a garden, or indeed in any other tillage, perhaps several times a year for many years successively, although frequently manured, will not be as productive as a piece that has been under grass several years, and not

had so much manure; the former being much more subject to be injured by drought than the latter, from which I am of opinion, that to preserve the fertility of land it should lie under grass as long as it conveniently could, and to vary the kinds of manure and productions.

I am, sincerely thine,

JOHN SELLERS.

RICHARD PETERS, Esq.

Answers to Queries on Plaister of Paris, by Mr. Edward Duffield, of Lower Dublin Township, Philadelphia County.

Dear Sir,

I received your favor of July 20th, 1796, containing a number of queries respecting plaister of Paris, viz.

Query 1. How long have you used the plaister of Paris?

Answer. Every year since 1783.

Query 2. In what condition was your land when you began the use of it?

Answer. It was under timothy grass rather poor, but was improved with three bushels to an acre the first year, the next year it was better, the third year about equal to the first, the fourth year I repeated the plaister at four bushels to an acre, when it was very good, at least two and an half tuns from an acre, and continued so several years. This lot hath been plaistered five times since 1783, and is yet good.

Query 3. What quantity per acre have you generally used?

Answer. From three to five bushels, according to the soil; if sandy three bushels; and more if loamy.

Query 4. What soils are the most proper for this manure?

Answer. Sandy or light loam.

Query 5. Have you repeated the application of it with or without ploughing—at what intervals, and with what effect?

Answer. I have generally found a good effect from it on grass ground, by applying it every third or fourth year without ploughing, and on Indian corn with ploughing.

Query 6. Do you find that it renders the earth sterile after its useful effects are gone?

Answer. Not in the least degree that I could ever perceive.*

Query 7. To what products can it be best applied?—grain and what kinds?—grasses and what kinds?

Answer. Its effect is immediate upon grass of all kinds, and upon Indian corn; and upon all other kinds of grain the year following, when it is well mixed with the soil by ploughing, &c.

Query 8. When is the best time to scatter it?

Answer. As clover is generally put in with barley or oats, I think the best time to apply the plaister is *as soon as the barley or oat is taken off*, as it gives a good growth to the clover before the winter sets in, which is apt to injure it when small. It may be put upon a sward at any time, and upon Indian corn as soon as it is up, *and*

* Mr, Duffield's son, and successor on the farm, does not continue of his opinion. There must be some peculiarity, or shift of circumstances, of a local nature. All my inquiries, elsewhere, result in the elder Mr. Duffield's opinion. Perhaps, like *lime*, *plaister* may be used too long. I never found it so. But dung, or other animal or vegetable substances, must be applied with the gypsum, as often as its operation is required: more especially after frequent repetitions.

R. P.

September 1810.

*scattering three or four bushels per acre over the whole ground is best.**

Query 9. What is the greatest product you have known by the means of plaister?

Answer. Of hay three tuns per acre; as to corn I cannot say, as I have generally used dung as well as plaister.

Query 10. Have you ever used it in connexion with other manure, and does it agree with lime?—and what effect has a connection with other manures produced superior to the plaister alone?

Answer. I have never tried it in a compost with lime or other manures.

Query 11. Its duration?

Answer. Its effect is perceivable for four or five years.

Query 12. Is there any difference in quality between the American and European plaister?

Answer. I have used both without being able to discover any; but have been informed that the Stucco

* This is the best though the most expensive way, as the roots of the corn spread far from the hill, and fill the field at one stage or other of the growth of the plant. But it requires good tilth to keep down the weeds. Nothing requires more clean farming than corn, which is seldom ploughed often enough. Only those who have experienced it, can conceive the wonderful increase of corn, with a ploughing extraordinary after wheat harvest; if it is done when the weather is moist. In a drought it is rather dangerous.

R. P.

workmen and the French burr mill-stone manufacturers prefer the American, as having a more binding quality; whether that makes it a better manure I cannot say.

You remark that "it is said in an English work, that plaister is composed of a mineral acid and a calcareous earth, and that it is good or bad according to the prevalence or deficiency of the latter." I think it is of the former and not of the latter, because it would require a much greater quantity of the latter (perhaps twenty five or thirty cart loads) to bring about the wonderful effects of three or four bushels of plaister.

You will find by Dr. Bergman, who has analyzed this fossil, that it contains twenty two parts water, thirty three parts calcareous earth, and forty five parts *vitriolic acid.** And you will also find in a small work of Dr. Home of Edinburgh, upon the principles of vegetation a variety of accurate experiments continued for the space of four years, in order if possible, to discover the food of plants, the result of which was, that it is a compound of oils, salts and acids.

If these gentlemen are right, we may conclude, that the wonderful effects of the plaister are occasioned by the great quantity of *acid it contains*, and that clover, above all other plants, requires the most acid in its food,

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*See hereafter Ingenhausz's theory of the supposed effects of oil of vitriol on vegetation.

See also the new theory of the *carbonic acid* being chiefly the food of plants.

as the greatest effect of the plaister is discoverable upon clover.*

Your most obedient,

Humble servant,

EDWARD DUFFIELD.

Benfield, August 16*th*, 1796.

The Hon. RICHARD PETERS, Esq.

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* I was gratified by Mr. D's agreeing in an opinion I had long held, and frequently mentioned to many others. I had conversations with Mr. D. since this answer. He, with me, tried many experiments with the view to this theory; and both were confirmed in it: though he, as well as myself, were not reckoned *orthodox*, by chemical *savans*. They insisted that the gyps was an insoluble compound, and that the acid must be first disengaged (which no doubt it is) before it can act. **R. P.**

September 1810.

Answers to Queries on Plaister of Paris, by the Rev. C. Wharton, D. D. near Wilmington, in the Delaware State. Now of Burlington N. J.

Prospect Hill, August 19th, 1796.

Dear Sir,

Since I was favoured with yours of the 20th ult. I have made inquiries among those of the neighbouring farmers from whom I could expect any information respecting the nature and effects of the gypsum. Much use I find is made of it in the upper parts of this country, where the land in general is hilly, and the soil stoney and thin, intermixed with a great proportion of isinglass. On these hills the effects of the gypsum are astonishing especially when spread upon clover.

One bushel or one and a half at most, is sowed upon an acre, and its produce is more than doubled by this procedure. They do not discover that the soil is any ways impoverished by the gypsum, but on the contrary rendered more able to support a rotation of crops for two or three years. I could not learn that they mixed it with any other kind of manure, or that they experienced much benefit except upon clover lands. They always sow it early in the spring, and have no other than what is brought from Nova Scotia. From my own experience, I am fully convinced of the advantages arising from this substance to some soils, and its inefficacy upon others. A narrow vein of dry gravel mixed with clay, runs through the farm on which I live; on each side of it the land is rather wet and a cold clay. On this latter I could never perceive any effect from the

gypsum, while the gravelly soil was so much benefited by it, as to furnish at least double its usual quantity of red clover. Some lots upon which it was spread three years ago, have not been manured since that time, and have already been mown twice this summer, and now exhibit the appearance of an abundant third crop. They were mown also three times last summer, but never pastured. I have never spread the gypsum but early in the spring, though I make no doubt but sown in a wet season, it would be serviceable at any time. For two years I tried this manure upon Indian corn; I first covered it in the hill with the corn, and the next year I applied it at the time of moulding, the quantity to each hill about a table spoonful. In both instances the corn assumed and retained a deeper green during the whole summer, than what grew around it upon land of the same quality. I think likewise that it vegetated quicker, *but I could not perceive that the quantity of grain was increased by this application.** To farmers therefore who are

* Dr. W. seems to carry the opinion, on this point, farther than Mr. Curwen. There may in some seasons be some foundation for it; but I think the ears are, in general, evidently increased by the plaister, though it may at times operate in greater proportion on the plant. Any other manure will do the same thing, according to the season. We have sometimes a great profusion of straw, and of course small ears of wheat, on our dunged, or new land. If land be too highly dunged, or naturally too rich, this is constantly the case. It depends therefore on the strength of the ground, or quantity of manure, as well as season, whether we shall obtain *grain* or *plant* in proper or undue proportion. It would be well to

in the habit of re-planting their corn it may be serviceable; but as I always *tar*† *mine* and so have no occasion

manure some part of a field with other substances, and plaister the rest, to compare the produce. This should be done for a course of three or four years, as in one or two seasons the weather may be more favorable to dung, &c. than plaister, or vice versa. My observations in general are against this opinion; though I have, at times, thought the plant had a greater proportion of the benefit of the gyps, than the ears. Great attention should be paid to destroy the suckers; which draw off the supplies both from plants and ears.

R. P.

†Tarring the seed corn is good against mice and birds, though it sometimes indurates and prevents the germ from shooting; but the cut-worm, or grub;* will, notwithstanding, cut off many of the young shoots above ground. A decoction of hellebore, mixed with sulphur, soot, and a little nitre, is equally offensive to vermin; and if the seed, after being soaked in this mixture, is encrusted with plaister, it *remarkably* forwards the growth. As to *re*-planting, it seldoms comes to much. *Transplanting* of plants raised in the garden, or any clean and rich corner of the field, is much more eligible. This is easily managed, by sowing in drills a small quantity of corn, at the time of planting the field. If the plants are not wanted, the loss, or trouble, is inconsiderable. Plants may also be had from hills in which too many seeds have been dropped. It is too common to have more plants in a hill than are

* Many persons aver, that furrowing out their fields in squares, and leaving the balks unploughed, till the corn requires that they so should be, effectually guards against the grubs; which feed on the grass and roots in the balks. It may be so, but this furnishes an excuse to slovenly farmers, and precludes fall ploughing, and perfect cleaning the soil. The remedy, or preventive, is worse than the disease.

R. P.

September, 1810.

for that tedious piece of business, *I shall discontinue the application of it in future to Indian corn.*

I shall be very happy to see the wonderful effects of this substance (I know not if I may call it manure) accounted for in a rational manner. At any rate the discovery of its virtues is extremely important to the American farmer, as it increases at so easy a rate the quantity of his herbage, and consequently of that species of manure upon which the success of his business principally depends. My intention is to make further experiments with the gypsum, and you may depend upon my furnishing you with the results of them.

I have, dear Sir, the honor to be,

With much esteem and respect,

Your humble servant,

CHARLES H. WHARTON.

Hon. RICHARD PETERS, Esq.

necessary or profitable. Three at the most are sufficient. Although I mention the places where the corn is dropped, by the common appellation of *hills*, we have for the most part abandoned the old practice of *hilling*. We do not omit the necessary use of the *hoe*, but we earth and tend our corn chiefly with the plough.

R. P.

Minutes of the Process and Result of sowing of Plaister of Paris, from the 3d of April, 1788, until the 5th of May, 1795, by Algernon Roberts, of Merion Montgomery County.

Process. April 3d, 1788. Drizzly evening wind at east, moon's age twenty-five days; sowed a half peck of plaister upon twenty perches in the high field; the soil a light loam mixed with flinty gravel, in cultivation at least four score years, without any manuring in my memory. Sown with red clover seed the spring twelve-months before sowing with plaister.

Result. 1789. This spring a perceptible improvement; the ground being subject to blue grass, and that not sufficiently destroyed by cultivation, rendered the improvement trifling.

Process. April 4th. Drizzly morning wind eastwardly, moon's age twenty-six days, sowed eight bushels of plaister upon two acres in the upper end of the young orchard; the soil in part a stiff and in part a light loam, under stratum generally a stiff clay, in tillage at least sixty years. A few years previous to sowing with plaister, limed at the rate of forty bushels per acre, and manured at random with barn yard dung, say fifteen cart loads per acre; red clover and timothy seed sown upon winter grain, both of which were much over-run with blue grass.

Result. 1788. Upon mowing both first and second crop, an improvement of at least four times the quantity, and the quality as much improved as the quantity of grass; the trees as apparently improved as the grass; the clover more benefited than the timothy; no perceptible difference of improvement in the different soils.

Process. April 7th. Rainy evening, wind at east, moon's age one day; sowed a half peck of plaister upon five perches in the high field; every observation applicable to April 3d, except the soil being a stiff loam, and situation rather level, although high.

Result. 1789. Spring; as yet no perceptible odds. Fall; a very perceptible difference; but the observations of the above may justly be applied to this. As I perceived no difference in the age of the moon when I sowed plaister, I of course discontinued minuting it as a chimera unworthy of notice.

Process. April 8th. Sowed the peach lot with plaister, about four bushels per acre; in cultivation not less than ninety years; the soil a stiff loam, under stratum a retentive clay, sward red and white clover, and green grass fertility of the soil very good; peach trees just beginning to bear.

Result. 1788. An improvement equal to the young orchard; the peach trees apparently benefited.

Process. April 8th. Sowed several spots in my meadow with plaister, at the rate of about four bushels per acre; the soil in general a light loam, in parts inclining to a gritty gravel, although in parts so flat as to incline to stagnate waters; under grass I believe at least fifty years, little or no manure put on it in my memory; quantity about five acres, about two whereof is watered with fresh spring water immediately from the spring head. Sward a mixture of red and white clover, and timothy, with many natural grasses.

Result. 1788. The improvement at least four fold, except in places on which the water stagnated for want of fall to carry it off, when I perceived no benefit from the plaister; the clover more improved than the natural grasses; the watered banks as much benefited as the unwatered, the water kept of after sowing till the operation of the plaister was perceived, after which time it was watered as usual.

Process. 1798. *April 6th.* Sowed two bushels of plaister upon the peach lot sown before April 8th, 1788.

Result 1789. I believe no improvement, but continued good.

Process. April 20th. Finished sowing my meadow with plaister about four bushels per acre; observations of April 8th, 1788, in general applicable.

Result. 1789. As beneficial as the parts sown last year, and all the observations of that time applicable to this.

Process. April 20th. Sowed that part of the young orchard with plaister that was left unsown the 4th of April, 1788; the observations upon that part apply to this.

Result. 1789. The same as last year.

Process. June 8th. Sprinkled two bushels of plaister upon about six acres of Indian corn; an old tilled, unmanured, gritty gravel soil.

Result. A considerable improvement.

Process. August 11th, 1789. Sowed half a bushel of plaister upon about forty perches of buckwheat just sprouting up; soil light loam, old land and very poor.

Result 1789. No perceptible improvement.

Process. April 15th, 1790. Sowed two bushels of of plaister upon the peach lot.

Mr. Roberts continues in the opinion that plaister does little for natural grasses. See 2d. vol. Page 121.

September, 1810. R. P.

Result. Continued good, I believe; not improved from last year.

Process. April 15th. Sowed twelve bushels of plaister upon five acres of the young orchard, sown before the 4th of April, 1788.

Result. 1790. No perceptible improvement, the clover and timothy being over-run with blue grass.

Process. April 6th, 1791. Sowed twenty-eight bushels of plaister upon the field above the orchard; quantity sixteen acres; soil a light loam, in parts mixed with a flinty, and in parts with a gritty gravel, under tillage at least sixty years; a few years before sowing with plaister, limed at the rate of about forty bushels per acre, and several times in my memory manured with barn yard dung in parts, and lightly sown with red clover seed the 9th of April, 1789; the roots much injured by a hard winter, but a profusion of young clover shooting up.

Result. 1791. Although a dry and unfavourable season for pasture, considerably improved in the fore part of the season, and very greatly in the latter part.

Process. April 13th. Sowed four bushels of plaister upon one and an half acre of the lot before the door; the soil a light loam, under tillage a century, and always,

since my memory, kept fertile, by frequently manuring with barn yard dung; sward fresh clover.

Result. 1791. As favourable as any heretofore.

Process. March 28th, 1792. Sowed two bushels of plaister upon the peach lot.

Result. 1792. Still continued good.

Process. March 30th. Sowed the meadow with plaister, at the rate of four bushels per acre; sown before in 1789.

Result. 1792. Considerably improved, but not equal to the first sowing.

Process. 1793. Sowed one and an half bushel of plaister upon the peach lot.

Result. 1793. Continued good, but no perceptible improvement from last year.

Process. April 1st, 1793. Sowed five and an half bushels of plaister upon one and an half acres of clover and timothy; sown with flax April 6th, 1792; in tillage about ten years, and limed two years.

Result 1793. Improvement equal, if not superior, to any heretofore.

1796. Upon mowing the first crop, the clover nearly run out; good crop of timothy.

Process. April 2d. Sowed seven bushels of plaister upon the lot before the door, sown before with plaister the 13th of April, 1791.

Result. 1793. Equally improved with the first sowing.
1796. Clover almost over run with blue grass.

Process. April 8th. Sowed twenty-eight bushels of plaister upon the upper field; quantity fourteen acres sown with red clover seed the 19th of March, 1792; in tillage eighty years; limed in the fall of 1790; and in parts lightly manured with dung; soil a light isinglass loam, with a small part mixed with gritty and flinty gravel.

Result. 1793. Perfectly equal, if not superiorly improved with any heretofore; no perceptible difference between any of the different qualitied soils.

1796. N. B. This field was so remarkably unfavourable to pasture, that it would not have subsisted fourteen sheep reputably through the season, although it is now one of the best of my pasture fields.

Process. April 7th, 1794. Sowed twenty-five bushels of plaister upon fifteen acres in the sand field; in tillage at least fifty years; limed in the falls of 1789 and 1792, at about forty bushels per acre each time; the soil a light

loam, and excessively poor before liming; sown with clover seed March 18th, 1793.

Result. 1794. Improvement no ways inferior, if not superior, (the extreme poverty of the soil considered) to any heretofore.

N. B. 1796. The pasture considerably declined, although very good compared to its former state.

Process. April 8th, 1795. Sowed twelve bushels of plaister upon the young orchard sown with red clover and timothy seed March 11th, 1794; and ploughed, limed and dunged since sowing it with plaister, in April, 1790.

Result. 1795. The improvement perfectly equal to the first sowing.

Process. April 8th. Sowed the peach lot with two bushels of plaister, *being the sixth time in seven years, without any other manure or tillage.*

Result. 1796. Upon mowing first crop appears equally good with any other crop heretofore; which together with many other experiments, convinces me that *a repetition of plaister without an addition of any other manure, will not injure, if it does not improve the crops of grass.*

Process. April 28th. Sowed thirteen and an half bushels of plaister upon six acres in the strawberry

field; limed in the spring of 1790, and well dunged in the summer of 1793; in tillage at least sixty years; soil a light and stony loam, sown with clover seed in March, 1794.

Result. 1796. The improvement so great, that after pasturing it down early in the spring, the appearance is in favour of mowing a good crop of grass, which I intend to do.

Process. May 5th, 1795. Sowed thirty-three bushels of plaister upon about eighteen acres of the far field, limed in the year 1793, and sown with clover upon oats in the spring of 1794; soil a light isinglass loam, and excessively poor before liming; in tillage at least seventy years.

Result. 1796. The improvement equal to any of the soils of equal fertility.

Process. I have tried many other experiments with plaister, upon several kinds of grain, flax, and garden vegetables, but with such various and trifling success, as to discourage me from a farther continuation of them.

☞ I have unfortunately mislaid a letter from Mr. Heckewelder, of Bethlehem, giving an account of the use of plaister on the Brethren's farms there, by Mr. Beidel and another, their superintendants. It is confir-

matory of the accounts herein before given, of the practice of other farmers. The farm at Bethlehem consists of loam, and other soils fit for plaister, on a substratum of lime stone. I have known several of the fields now in grass for near thirty years. I think Mr. Beidel has used plaister near twelve years. The appearance of the grounds now under clover, was so much superior last summer when I saw them, to their former aspect, that I was surprised at the contrast. Nothing can exceed some of these grounds. The low meadows on the Manacasey, which were formerly neat and in high order, appeared comparatively neglected, and some of them in very bad condition. I asked Mr. B. the reason of this alteration. He informed me that the advantages derived from the plaister on the up-lands, were so great, that it was questionable whether he should pay any further attention to the low meadows, except as grazing grounds.

R. P

Answers to Queries on the Subject of Plaister of Paris, as a Manure; by Richard Peters, of Blockley Township, Philadelphia County.

Query 1. How long have you used the plaister of Paris, as a manure?

Answer. About twenty-five years. I was among the first who began the use of it in Pennsylvania.

Query 2. In what condition was your land when you began to apply it?

Answer. Worn out by long and bad culture; full of weeds and other noxious plants; some annual, others perennial.

Query 3. What quantity per acre have you generally used?

Answer. From four to six bushels, at one strewing, I have formerly thought the proper quantity per acre; but lately I have not commonly exceeded three bushels. I have had as much effect from two bushels, as from any greater quantity per acre, when season and other favourable circumstances combined. It is difficult to fix the requisite quantity, as effect much depends on accidents of weather, &c. which cannot be calculated with any certainty. There appears to be a certain point in the operation of plaister, which is not gained by additional quantity, so much as by a combination with extraneous circumstances, difficult to trace or account for. When this *point of saturation* is arrived at, I question whether any increase of quantity will extend the effects.*(a)*

(a) On the principle that *gyps* is *a salt*, [*vide note r.*] and salts check fermentation when applied in too great quantities, it may be presumed, that the requisite quantity of plaister, is regulated by the fermentable putrefying substances it finds in the earth on which it is strewed. If these be scarce, a great quantity of plaister, beyond what is necessary to operate with them, is hurtful. I remember to have sowed, on a strip across a field, some years ago, a great dressing of plaister; perhaps in the proportion of ten bushels to the acre. *This strip produced little or nothing, till I dunged the field for wheat, two or three seasons after the over dose of plaister.* I was surprised by this small strip recovering itself, and remaining for years superior to any other part of the field. Yet I have heard of ten bushels to the acre, being strewed to good effect.* But I know not the state of the ground, as to the pabulum for the gyps. I never found it beneficial, to sow the plaister in any such quantity.

I, many years ago, divided half an acre of ground into square perches, to try the effects of common salt. I began by scattering a proportion of two bushels of salt to the acre, increasing the quantity on every perch. I numbered the divisions, and kept an account of salt sown, and the produce of wheat with which the whole was sowed. I have not the memorandum of this experiment at hand, but I think the wheat dwindled with eight bushels to the acre, and nothing grew after, I believe, the proportion of twelve bushels of salt. I mention it now, because it seems analogous to the present subject; for I recovered the ground by moderate dunging. The spot salted might be perceived for many years after-

* On inquiry I found this was a mistake. R. P.
September, 1810.

Query 4. What soils are the most proper for this manure.

Answer. Light soils, dry and sandy, or loamy. On clay I never succeed, though I have heard of its being used on clay with a degree of success.*(b)* On wet soils I have always failed. I have strewed it on mossy swamps. On elevated spots in these swamps, it has killed the moss and thrown up white clover wonderfully; but has done nothing where the water around these spots continued on the ground in the smallest degree. I have heard of some instances to the contrary, but none have fallen under my observation.

Query. 5. Have you repeated the application of it with or without ploughing?—at what intervals, and with what effects?

Query. 6. do you find that it renders the earth sterile after its useful effects are gone?

Answer. I have beneficially repeated the application with and without ploughing; but I succeed best in a repetition after cultivating, and dressing slightly with stable manure, or with ploughing in green manures. I have ploughed in buckwheat in full blossom (which in a fortnight or three weeks, often in less time, becomes putrefied and converted into excellent manure, having undergone a violent fermentation) and sowed winter grain, on which I have sowed clover seed; and having strewed plaister on the clover, similar, if not greater effects, have been produced than were received from the first dressing. Ploughing in clover affords a pabulum for the plaister, which fails often in mellow grounds in fine tilth, where the putrefied substances are scarce, or have been exhausted by ploughing and frequent exposure. In short, I find it must have something to feed on, as some farmers express it. In the first application, it has the decayed roots of vegetable substances it finds in the earth. I perceive no greater degree of sterility after plaister, than after dung. All manures are stimulants, and leave the earth wearied and vapid, from the exertions they have excited. Stable dung as bad as any if

(b) Where it has any success on clay, it is rare. The President (whose lands at Mount Vernon and in its neighbourhood, are generally strong clay, or inclining thereto,) has frequently told me, that he has always been unsuccessful with plaister. I think he has tried it from one as far as twenty bushels to the acre, without any kind of benefit. That I might be accurate in this account, at my request, he was pleased to inform me, that he had "tried the plaister of Paris on his land (which is stiff and cold) at the rate of from one to twenty bushels to the acre.—It has been spread on grass and ploughed land.—On the latter it has been ploughed in;—harrowed in with a common tined harrow; bush harrow:—and not harrowed at all. The effects in *either* and *all* the cases, were not more than if he had taken up as many bushels of the same earth and scattered them again over the surface of the ground. Yet he believes *in, and is a friend to gypsum as a manure.*"

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wards, by the extraordinary verdure of the grass (chiefly white clover) which grew spontaneously on it.*

* This experiment is alluded to in my communication on *salt*. 2 vol. Memoirs. 173. But by a typographical error, *pounds* are inserted for *bushels*. I went as far as 20 bushels to the acre, (or in that proportion) most uselessly and injuriously. R. P.

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not worse; as it leaves the ground full of weeds, unless it be sufficiently rotted, or used in compost.*(c)*

Query. 7. To what products can it be most profitably applied?—grain and what kinds?

(c) It is as much on account of its containing the seeds of weeds, as its supposed inferiority in other respects, that the Chinese neglect the dung of horses and cattle, as we do human excrements. But they provide every where, "covered reservoirs for storing up what is dropped, in most countries, uselessly in the privies and streets," *Ingenhausz* is apparently extravagant in his preference of human alvine and urinous ejections, to those of horses and cattle. He goes so far as to suppose, that these ejections from an individual, will manure as much ground as would produce more vegetables than he could consume; and by selling the superfluous portion, he might purchase enough of other food, to render the vegetables palatable. However improbable this may appear, there may possibly be more solidity in the observation, than our inexperience, and perhaps ideas of delicacy will permit us to believe. The Chinese have as much knowledge of practical agriculture, as any people in the world. Their immense population compels them to concentrate their efforts to this point, so as to raise the most off the smallest possible portion of ground. Antipathy, and habits of using other manures, will prevent our following the Chinese, in their practice of manuring. Lime, burnt clay, calcareous earths of all kinds, and even common earth, deprive the most putrid and nauseous substances of their disagreeable qualities, and assist them in promoting sweet and wholesome vegetation. Night soil is so strong, that a fifth part is a sufficient proportion for a compost; and it should never be used by itself. Two loads, mixed with ten of earth, and one of lime, are sufficient for an acre.

Answer. I never found any beneficial effects from strewing it on winter grain.*(d)* It is useful for all leguminous plants, (buckwheat, a bastard legume) flax, hemp, rape, and other plants, whose seeds produce oil. It is also beneficial for most products of the kitchen garden and fruit trees; Indian corn and turnips. Oat and barley seed wet, and covered with as much plaister as will adhere to them, are much benefited. I have found little or no use in a top dressing of plaister, on either of these latter grains. It is generally most profitably used for red clover; though it will do excellent service to any grass.* White clover, being the natural grass of most countries, in certain soils, is most commonly thrown up by plaister, (as it is by several other manures) though there was no appearance of this grass before the application.

Query 8. When is the best time to scatter it?

Answer. I have sown it in most seasons of the year. If strewed in the fall, and a dry frosty winter succeeds, much of the plaister is blown away. I have found it answer well, if sown at any time from the beginning of February to the middle of April, in misty weather. I I have frequently sown it on the snow in February,

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(d) See my remark on query 10th, which shews the operation on clover, so as *to ruin the wheat crop sowed with it.*

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* This assertion is too broad. I doubt its efficacy on grasses, others than those of the treifoil tribe. At least there are many grasses on which it has no effect.

R. P.

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and it has done well. Some do not sow it till the vegetation begins. It seems to me, that if strewed at any season, it will have an effect; though, perhaps in a greater or less degree, according to the state of the weather, or other accidental causes.*(e)*

(e) I believe that all manures put on as top dressings, are most beneficial in the spring; when the plant is active, and draws in the food they supply. *Dung*, or other manure, laid on superficially in the autumn or winter, loses much by the washings of the winter rains, &c. It can do little service while the plant is torpid, except as a cover from frost, and by depositing what is left of its salts and juices, ready to act on the plant when vegetation begins.

I am inclined to believe, from more attentive experience since, that my opinion, stated in the foregoing note, is not generally founded in fact; though the theory appeared to me plausible. I have been highly benefited by both compost and dung, as top dressings, in the autumn. On one field, I left a part to be covered in the spring; after most of the ground had been dunged in the fall. The effect was greatly in favour of that dunged in the autumn. Ploughing in manure, will effectually prevent its washing away by winter rains. But I think the shelter given by dung or compost to the grass, or grain, as a top dressing, and the mixing of the salts or component parts of the dung, or compost, by means of frosts and thaws in winter, with the earth, far overbalance any loss by the washings of winter rains. The evaporation which carries off the volatile parts of the manure, is certainly less in winter, than in spring, or summer. With plaister strewed in winter, I have succeeded as well as in any other season of strewing.

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Query. 9. What is the greatest product of grass per acre, you have known by the means of plaister?

Answer. As much as from any other manure. I I never weighed, or kept an exact account. I think I have had five tuns per acre, at two cuttings, in one season; and I have sometimes cut a third crop; though I seldom do this, as I prefer feeding the third growth. The hay is in my opinion better than that produced by dung. The cattle waste less of it. I have dunged part of a field and plaistered the residue. The cattle and horses will reject the grass on the dunged part, while they can get the smallest bite off that plaistered. I have never desired over luxuriant crops of grass. The hay of these is not so nutritive as that of a moderate growth. The stock will not consume it to advantage, though I often salt it. I am content if I get a tun and an half, at a cutting on the acre. This will stand well to the scythe, and does not, like over luxuriant grass, die, rot, or become feculent and musty at the root.

Query 10. Have you ever used it on ground dressed with other manure, and what? and the effects if any superior to the plaister alone?

Answer. The answers to five and six comprehend, for the most part, what I have to say on this query. In England, it is said the plaister fails where the "land has been *limed*:*(f)* that it operates best on virgin soils*

(f) It is said in a late English publication, that the gypsum chiefly consists of a mineral acid and a calcareous earth; and as the one or the other prevails, it is good or bad.

* See note page, 48.

and does not answer on lands which have been long under tillage." We find the direct contrary effects here. It is true we do not lime here, nearly as highly as they do in England. Our lands will not bear so much lime as theirs. We have as good and as bad land, as that of any part of the world. The poorer the land, the less lime it will bear. But our best land will not admit of so much lime at two dressings,* as I have understood they put on in England, at once. Whether our lime is stronger, or our climate less favourable to it, I cannot tell. A difference of climate may have an operation on plaister, as it has on products. Vegetation is here more rapid than that of England, and of course our harvests earlier. The straw of their wheat is, I believe, generally shorter than that on our fresh or manured lands, and the ears larger and fuller, where the wheat is good; for they are not without a due proportion of bad wheat, with light and small grains. So that we do not generally get so much wheat off an acre, as they do. But our wheat yields a greater proportion of flour. It is not so flinty, is thinner skinned, and of course we have less offal and more flour. Our grain grinds more lively, and without kiln drying. Much of their wheat requires kiln drying, before it can be ground to advantage, and especially grain intended for exportation; owing to its qualities, produced by moisture and other circumstances of climate. In Ireland their grain, ground at their best mills, is generally kiln dryed. We know neither the necessity nor use of kilns in our mills, except for

* I might have said three or four dressings. Land over limed, or limed too often, may be restored, by green manures ploughed in, or dung. R. P.

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Indian corn. On the contrary, our millers sometimes damp the wheat, to prevent the bran from being ground so fine as to pass through the cloth, and speckle the flour. This account is given to shew the effects of moisture in the English and Irish climate, in comparison with that of our country. I believe that plaister will not answer so well in a moist, as in a moderately dry climate. A very wet season here, is not the most favourable to plaistered grounds. The advantages of the gyps, over other manures, are most perceptible in dry seasons. I doubt, however, be the effects of climate what they may, either on products or manures, whether in England, the plaister has had a long or fair trial. I find, by some late English publications, that the knowledge of it is not extensive, and its use confined to a few agriculturists; some of whom give the most flattering accounts of their success in its application.

Many of my fields are limed as highly as they will bear. Some part of my land is fresh; a small part remains in an exhausted state. I apply the plaister to all, and do not find any difference unfavourable to that which has been limed. Some years ago, I sowed clover with wheat in the autumn, on a field highly limed. I plaistered a part of this field, on the clover and wheat; the whole having had a light dressing of dung. The succeeding season, the plaister threw up the clover in such profusion as to choak the wheat crop, in a great degree. I lost my wheat on the plaistered part, as I mowed, not being able to reap, the crop. The wheat on the other part was excellent, and the clover of moderate growth. I am aware that part of my misfortune in the loss of the wheat, may be attributed to the

clover getting too forward, by being sown at the season of seeding wheat. Yet a comparison with that in the same field not plaistered, sufficiently shewed the effects of the gypsum. I have not repeated this mode of sowing clover, which I then practised to avoid the loss I had sustained from late frosts, which sometimes destroy the young clover, sown on wheat in the winter.

Some farmers object to sowing plaister on the clover sown on winter grain, while the grain is in the ground;*(g)* and do not strew the plaister till the next season. Perhaps this may be best. But I have met with no loss by strewing the plaister on the clover and wheat, when the clover seed was sown on the wheat in February. On the contrary, in a dry spring, it has saved my young clover, and forwarded the grass, so as to enable me to mow a tolerable crop in the autumn next after the wheat harvest, which, being cut with the stubble, I have given, in the winter, to dry cattle. What they rejected, increased my dung heap. It has been, however, most common with me, to sow the plaister in the spring next succeeding the grain harvest.*

(g) It is an opinion, perhaps founded in prejudice, among some farmers, that its quality of attracting moisture, assists in producing *mildew*. I have had fields plaistered, and those which were not, equally mildewed, and equally free from it, in the same seasons, according as the mildew prevailed or not, in the country surrounding my farms.

* This is now, and has long been, my practice. I have found sowing the plaister on the clover and wheat too hazardous.

R. P.

September, 1810.

Query 11. Its duration?

Answer. When it throws up gentle and moderate crops, its efficacy is of the longest duration. If it is violent in its first operation, it is of short continuance. I have known it exhaust itself in one year. But I have had benefit from one dressing of three or four bushels to the acre, for five or six years, gradually decreasing in its powers. I prolong the efficiency of dung, by plaistering the second or third year, when the clover, on dunged or any other ground, begins to fail. Perhaps the scattering it annually, or every other year, in small portions, will continue for a length of time gentle operations, and prevent violent efforts. I have heard of some who have practised sowing it frequently, and in small quantities, and obtained good crops of grass for twelve years and upwards.

The weeds of our fields,*(h)* which have been at former periods under bad culture, forbid their laying in grass,

(h) The *Japanese*, as well as the *Chinese*, reject the dung of horses and cattle, because they contain the seeds of weeds, and use night soil, which their laws compel them to save. "Their fields are for this reason, (among others) so free from weeds, that a celebrated botanist, passing lately through Japan, with the Dutch embassy, could scarcely find any other plants on the corn fields, but the corn itself." Ingenhausz *food of plants*, page 15. If what has been quoted on this subject will have no other effect on our practice, it ought to warn us to be more careful in rotting or composting our dung of horses, &c. and to prevent the seeds of weeds mixing with our manure. Nothing in this country is in so miserable a stile as the mismanagement (with some exceptions) of our stercoraries. The

especially if only pastured, so long as it would be otherwise desirable. Cutting annual weeds, before they seed, will destroy them. Perennials cut at proper periods, may in a great degree be conquered. At any rate, their seeding may be prevented; and the old stock destroyed by ploughing. But the abominable custom of suffering weeds, briars, &c. to grow in corners and about fences, will forever afford nurseries of these pests, which will keep up a succession of these nuisances, in fields otherwise well cultivated. The rotting of fences, articles of no small expence and labour, is not the least evil attending this negligent habit. The few farmers who are careful to destroy weeds in their own fields, are too often infested by those of their slovenly neighbours. In some parts of Europe there are laws which authorize those who destroy weeds in their own, to cut those in the adjacent fields of an obstinate or negligent neighbour, and obtain summary process from a magistrate, to reimburse the expence. However unpalatable such laws might be here, they shew that the destruction of weeds is considered highly important, in countries where a good stile of agriculture prevails. The truth is, that a farmer should be

dung is left exposed to rain and sun; thrown about carelessly in our yards, when the cattle do not drop it uselessly in the fields. The heaps, which are often made in holes, or hollow places, where the stagnant water prevents putrefaction, are permitted to be poached and trodden by our cattle, or still more firmly pressed together, by loads haled over them. So that the air cannot be admitted to produce a thorough fermentation, and by this means to kill the seeds of the weeds, which are ruinously destined to be the pests of our fields, and the destroyers of our crops.

in constant hostility against these formidable foes. His reward in a victory over them, will be a certain increase of his crops, which will be doubly benefited by every effort to destroy useless and noxious plants.

It would entitle any person to the gratitude of his fellow citizens, who could point out a mode of destroying with the least expence and labour, the weeds which infest our fields. However contemptible it may appear on a slight view, it is an object worthy genius and industry, to botanize for the perfect understanding of the nature and properties of weeds, for the purpose of their destruction. In my tours through this state for some years past, I have observed, with melancholy attention, the most destructive weeds, and particularly the St. John's Wort, overspreading our country. The ransted,* has now passed the mountains. The more fertile the soil, the more it is subject to be over-run by them. Though I have subdued many, yet these weeds, and particularly the St. John's Wort,*(i)* have baffled

* Toad-flax.

(i) Two well attended crops of Indian corn or potatoes, will conquer the old stock of this weed; but I have had, after I supposed it eradicated, a new growth from the seeds which had dropped, and remained in the earth. It grows from both roots, slips, and seed. I have destroyed this new growth by turning up the roots, by a shallow ploughing, to the frost of a severe winter. Those who have not yet been visited with this scourge, should be watchful to eradicate it, at any expence or labour, on its first approaches. A small degree of expence and attention will then *prevent*, what it is extremely difficult to *remedy*, when it has gained full possession of their fields.

my endeavours at their complete destruction. I have obtained temporary victories over them, but have yet to combat their ravages. I know of none in the pestiferous catalogue, so exhausting and destructive as the St. John's Wort. Besides its being injurious to cattle and other stock, it is the greatest enemy the clover husbandry has to contend with. Plaister will, by forwarding the red and white clover, and other grasses, overpower many weeds; but it has little, if any effect on the St. John's Wort, or ransted.

Query 12. Is there any difference between the American and European plaister?

Answer. I have in general found the European plaister the best. But I have used the Nova Scotia (the only American plaister I am acquainted with) to equal advantage. I know not whether there has been any chemical analysis of these plaisters, to enable us to judge of their relative qualities. The quarries in Nova Scotia may turn out better the more they are worked and explored. There is a variety in the American plaister, some being much better than others.*

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*The *Nova Scotia* plaister I have used for many years. I find it equal to any imported from Europe. I have seen very little plaister from Europe of late years; as that from Nova Scotia answers all agricultural purposes perfectly. And I believe all other uses.

R. P.

September, 1810.

MISCELLANEOUS OBSERVATIONS

ON

PLAISTER OF PARIS.

THE prejudices for and against this manure are equally violent; and their is no way of correcting them, but by the results drawn from sober and continued experience. In Germany, where this fossil has been the longest known and used, opinions have been very opposite, and many of them very absurd and ridiculous. Not only sorcery and witchcraft have been charged on those who used the plaister, but it has been said by some *wonderfully wise* people there, that it produced or attracted *thunder* and *lightning*. Some of the petty princes of that country have made edicts against the use of it, urged, perhaps, by the bigotry of its opponents, and the unfounded German adage: "that it makes rich fathers and poor children." The peasants have, however, in opposition to these weak and tyrannical prohibitions, sown the plaister on their fields in the night. I have seen a treatise in German, on the subject of gypsum, as applied to agriculture, containing many excellent observations and useful lessons, mixed with some

anecdotes and discussions, sufficiently amusing, to cheer one through dissertations, on a topic apparently insipid and unentertaining.

After all that our present experience enables us to say, we have much to learn on the qualities and effects of the gypsum, as it relates to agriculture. I have known it produce no effect for four years, and then throw up a most astonishing vegetation; and this after repeated ploughings, for both winter and summer crops. In a field now in clover, I perceive it most luxuriant, where Indian corn hills were plaistered with no effect on the corn, four or five years ago. This is one among many instances I have had in my own fields, and have heard from other farmers, of similar effects.*(k)*

Whatever be the cause, *dew* will remain on a part of a grass field plaistered, an hour or two in a morning, after all moisture is evaporated from the part of the same field not plaistered. I have also frequently seen this effect in my garden beds, which, if plaistered, will

(k) May not this be accounted for, by supposing that the operative principle in the plaister, was an over-charge for the fermentable substances then in the earth; and that it did not find enough of these substances to operate on, until the time when it produced the vegetation here mentioned?—[*Vide note (r).*]*

* I have on several occasions observed strong tufts of clover, sometimes of wheat, when I have dunged a field, which had been plaistered on the corn hills, where those hills had been. I supposed the dung afforded a pabulum for the acid of the plaister which had been lavishly thrown on the hills; and, until the dung was applied, remained in combination. See vol. 1, agricultural memoirs, page 174. R. P.

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retain moisture, in the driest seasons, when there is not the least appearance of it in those beds whereon no plaister was strewed. If water be, according to an old*(l)* as well as modern opinion, "*almost all in all*," in the food of vegetables, the plaister attracts, or retains, abundant supplies.*(m)*

I do not like the plaister ground too fine. It flies away in strewing, and is not so durable as that moderately pulverized. I think it sufficiently fine, if it be ground so as to produce twenty bushels to the tun. It is most common now, to make twenty-four or twenty-five bushels of a tun.*(n)* I have endeavoured to prevent the finer

(l) *Lord Bacon.*

(m) *Ingenhausz* is of opinion, that *water* is only a vehicle of the food of plants, and by no means the true nourishment of animals or vegetables,—the less so, as several plants can live without being in contact with water. *Essay on the food of plants*, page 1. But *Chaptal* thinks water so essential, that he says, (page 448, Philadelphia edition) "A plant cannot vegetate without the assistance of water; and that it is *the only aliment the root draws from the earth.*"

(n) As a caution to farmers, I mention, that, at a late trial of a cause in Bucks, between the buyer and seller of a horse, it appeared in evidence, that, after his death, several stones, weighing in the whole 15 pounds (one of them 7 pounds) were found in the rectum and other viscera of that animal; and these were said to have occasioned his death. In another instance (in the neighbourhood) of the death of a horse, 17 pounds weight of similar stones were found in his intestines. The proprietors of these horses had their horse-feed, for a length of time, chopped at a mill where plaister was ground; and the grain for horse feed chopped by the same

parts from being blown away, by damping it. But I do not find that it can, in this state, be so equally distributed; it being apt, when thus damped, to collect in lumps.

It should always be remembered, that *calcination*, however necessary it may be to make cement of plaister, lessens, if not destroys, its agricultural uses.*(o)*

We have a simple mode of trying the quality of plaister. We put a quantity pulverized, into a dry pot over the fire; and when heated, it emits a sulphureous smell. If the ebullition (arising from whatever cause, be it the escape of air, or dissipation of its water of chrystallization) is considerable, it is good. If it be

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pair of mill stones. This circumstance, and the appearance of the petrifactions, have occasioned a belief, that they were formed by collections of plaister, mixed with the feed, and taken in therewith by the horses, from time to time. This opinion may not be well founded; as *calculi* are produced in animals from other causes. But such *calculi* consist generally of urinous particles; and are found in the bladder or kidneys. They have not commonly foreign matter for their basis; though it sometimes happens otherwise. The bare possibility of it should produce circumspection, to avoid the danger of such accidents.*

(o) [*Vide Chaptal's Chemistry vol.* 1, *page* 212.] Where the analysis of the gyps is given, and it is said that it loses 20 *per cent, by calcination.* Chemists say it loses only its water of chrystallization.

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*Since I have discovered the violently purgative quality of the plaister, I doubt that these *calculi* were formed of the calcareous, or other, part of the gypsum. Let those better qualified decide.

September, 1810. R. P.

small, it is indifferent. If it remains an inert mass, like sand, it is worthless.

One might suppose, from this rude experiment, that plaister was good or bad, according to the quantity of *phlogiston* it contained.* When phlogiston was in fashion (for its existence is now denied) it was said to be a considerable ingredient in the food of plants. See *Young's* experiments, in his Annals, on this point. It may be also, that the greater the proportion of calcareous earth, which absorbs the vitriolic acid in its composition, the better the gypsum. Some have supposed mineral acids to be inimical to vegetation; while others have asserted, that the vitrolic acid will greatly

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*Although some of the theoretical ideas I have hazarded, have since been useful in prosecuting practical experiments; I should have omitted many of them, had I been enabled to accomplish my design of condensing the whole of what is now known, into a short and regular system. I leave them as they are, though some speculations might be suppressed. I believe *Mr. Young* does not now value the experiments he exhibited, to prove *phlogiston* to be the food of plants.—Practical farmers do best, when they content themselves with exemplary facts. Theorists, agricultural as well as others, frequently employ themselves in groping in the dark. Light is, however, often approached, through dark and devious passages. The phenomena of the *gyps* were so extraordinary, that all endeavours to develope its mysteries, seemed justifiable.

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assist and promote the growth of plants.*(p)* Perhaps

(*p*) *Ingenhausz* a celebrated advocate for the new chemistry, of which Mons. Lavoisier was the founder, has, this year, (1796) published "an essay on the food of plants, and renovation of soils." He imagines wonderful effects may be produced by oil of vitriol (or any concentrated acid, much diluted with water, or mixed with earth) poured on the soil immediately before sowing. The cost of this manure about two shillings sterling per acre. He relates some experiments on a small scale, confirmatory of this hypothesis, but acknowledges it *now* to be mere theory. His opinion, and that of others cited by him, is, that *fixed air*, now called, in the new nomenclature, *carbonic acid*, (from its being found plentifully in chalk, it is also called *cretacious acid*) is, in a great degree, the food of plants. He asserts, in opposition to Dr. Priestly and others, that plants thrive the best in *oxygen* or *vital air*; or at least cannot live without it. His theory, which is among the most modern, is, that carbone (charcoal) though of itself no manure, is the foundation of the food of plants; but must be mixed with *oxygen* or *vital air*. Plants, according to this theory, decompose the air surrounding them; and, by this process, assist in producing their own food. That this process is performing at all times, by the roots and flowers, but is carried on by the leaves and stalks in the night, or shade, and inhaled by the latter in the cooler parts of the day; but constantly from the earth (where it is chiefly deposited) by the roots. That plants accelerate their growth in the dark, and advance the least in the middle of the day. That they possess the power of *shifting* carbonic acid from the air, by attracting its *oxygen*, and furnishing it with *carbon*; and that they also possess a wonderful faculty of changing *water* into *oxygen* or *vital air*. That the *oxygen* is also acquired from the common

a due mixture of the acid with the calcareous earth, may turn into wholesome food, what of itself might be injurious to vegetation. But as I chiefly relate agricultural facts, I leave the discussion of such points to philosophers and chemists. It is enough for us if we know effects. Causes are often hidden, among the arcana of nature. Nothing has evidenced a greater diversity of opinion, among the most eminent men, than the question. "What is the food of plants?" Nor do they agree about the nature of the air contained in vegetables. Some assert it is mere atmospheric air, changed, or liable so to be, into *fixed*, by ebullition—*phlogistic*, by fermentation—or dephlogisticated by the sun, *the light* whereof operates a change in this air, not produced in

air, by the soil; and this *vital air*, being mixed with the *carbon*, becomes *carbonic acid*, and enters the plant through its roots. *Ingenhausz's* doctrine, in another place, (an old opinion) is that the earth, of itself, does nothing towards the support of plants, their food being chiefly acquired from the air; "the principal business of feeding being carried on by the leaves in the atmosphere." The seed is said to contain the *carbonic acid* sufficient to forward the plant, till it is enabled to acquire fresh supplies from the air, and through the earth, which contains this acid in great plenty. I give but a faint, and perhaps inaccurate, recital of these theories, merely to shew the variety of opinions among men truly eminent on both sides; and because those here mentioned are some of the most modern. Farmers should not overlook theories; but they should depend only on careful and judicious experiment and practice.

plants in *the shade.(q)* Of what nature or species is the air contained in plaister; or whether this substance operates by its powers of attracting or retaining moisture, and decomposing, preparing and communicating to plants, the air, the fittest for their nourishment; must be decided by others than practical farmers, to whom profitable effects are more important, than the most learned and ingenious theories.*(r)*

(q) Ingenhausz on vegetables page 184, 185, *food of plants &c. Vital air*, produced by vigorous plants in the sunshine, is of the gr atest purity in itself. The air thrown out by them in the shade or in the dark, *is of itself, unmixed with other air*, the most active poison in destroying animal life.

(r) Ingenhausz, page 12, *Essay on the food of plants*, &c. after observing, that "all the most powerful manures have one common quality, viz. to contain, or to disengage, a great quantity of *carbonic acid*, proceeds to suppose, that animal and vegetable substances probably act as manures only, *when in the act of decomposition by putrefaction*, during which period a great quantity of *carbonic acid*, is produced. *This putrefaction is promoted by almost all salts* when *mixed with those substances* in moderate quantities, *but is checked by a large proportion of those salts*, as Sir John Pringle found. It is thus with alkaline salts, with common salt, *gyps*, *which last is a vitriolic salt*, with an earthy basis. This notion may account for the benefit, which the Germans and the Americans derive from employing *gyps*, as a manure. The latter find it even worth their while to draw this ingredient *(gyps)* from Europe." "According to these notions, we may perhaps understand, why all those manures which undergo the quickest decomposition ought to be oftner applied

It is customary, with some farmers, to sow plaister every year, on the same ground, in smaller quantities, *i. e.* about a bushel to the acre; and some sow less, for several successive seasons. Some sow it every other year. Those who practice these methods (by all of which I have occasionally profited) consider them most beneficial, for grass grounds particularly. I have generally thought it best, to get abundant products in the shortest time. I have therefore applied the gypsum in greater quantities, to the clover husbandry; and its operations were in full vigour, as long as the clover continued on the ground. When the clover fails, I plough and proceed with the usual course of crops, till it falls again into its common rotation. This generally happens in the third year from my ploughing up the ley or sod, as it succeeds winter grain, which I have seldom sowed on my worn lands, unless they are previously limed, or

than some others, which, not being susceptible but of a very slow decomposition, such as chalk, lime, burnt and pounded bones, *gyps*, impart, during several years, to the soil a prolific quality."* I had not seen this essay, when I gave an account of my experience on the plaister. But I am much confirmed in some of my conjectures, since reading this production; and particularly in my opinion, that the plaister operates most powerfully, when in connexion with animal or vegetable putrefied, or putrefying, substances.

* Whether the decomposition of the *gyps* is slow or quick, is a mere conjecture. I find myself safest when I adhere to facts. From the invigorated appearance of vegetation, if a rain immediately succeeds the sowing the plaister, I have thought the gyps was quickly decomposed; though not so rapidly, as not gradually to yield its acid. I do not contend for theories, if results are sufficient without them.

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dressed with stable manure, or buckwheat ploughed in as a green dressing. I have sometimes ploughed in the last growth of the clover, of the second or third year, and harrowed in on the sod, after once ploughing, wheat or rye, on which I have sowed clover seed, and plaistered again. I have done well enough in this practice, though I do not think it neat or good husbandry. It should not be done if the ground be poached, or foul with weeds or blue grass, which require frequent ploughing to destroy them.

I sow clover with spring grain generally, and scatter plaister on the clover and grain, but doubt its effects on the grain, as a top dressing. I often sow clover seed with plaister on buckwheat, and the plaister operates powerfully on both clover and buckwheat. Clover seed sown on flax, answers well. The plaister has a great effect on both these plants. The pulling the flax does no injury to the clover. If the buckwheat seed be wet, and strewed over with a coating of plaister, the crop is much benefited. I sometimes mix the clover seed with the plaister, and sow them together.

There are various opinions as to the manner and time of plaistering Indian corn. If season and other circumstances are favourable, the mode then used is naturally conceived to be the best. But there is no deciding from one or two fortunate seasons. Some put it on the hill soon after, or at the time of planting; some at the time of moulding; and others at a later stage. Some suppose, that if it be put on, and could be confined to, the plant (though this is impossible, for the earth will receive the greater part, either while it is strewing on the plant, or by the washing of rains) it is the most

beneficial. I generally strew it on both plant and hill.* I have put it on the hill only, and have scattered it over the whole field. I have met with success generally, but sometimes disappointment, in all these modes of application. The one I generally practice is, strewing it on the plant and hill, when the leaves are fairly formed; or, at the latest, when the corn receives its first dressing; which is most commonly done by harrowing over, and uncovering (if necessary) the plants, though the hoe is used when requisite. But the plaister is always strewed after this operation, that it may remain on the surface.

I have always considered it necessary to keep the plaister, as much as possible, on the surface. In some anomalous instances, which I consider as exceptions to any general rule, it has operated when ploughed in; but for the most part it does best as a top dressing. I had been informed of a practice of sowing plaister with seed wheat, and ploughing both in together. This (and every other mode of application of the plaister to winter grain) has had little, if any, success with me; though I have tried it in every way I ever heard of, or could imagine.

Good crops of winter grain have often succeeded clover, to which no other manure than plaister on the clover, had been applied. I attribute this to no immediate action of the plaister on the grain, but to the clover; which always ameliorates the soil. It is an ex-

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* The spot in which the plant grows is yet often called a *hill;* but the practice of *hilling* corn has been generally discontinued, for a great number of years past.

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cellent covering crop, and, like most tap rooted plants, does not exhaust; but on the contrary increases fertility. I have known a good crop of wheat, follow the ploughing in a luxuriant vegetation of young, succulent teazle and thistles;—tap rooted plants. These apparent pests had for several years occupied the field. They had operated as a cover, and, when ploughed in, as a green manure.

The lot on which I first strewed plaister, twenty-five years ago, has not been ploughed during that period. I have twice given it about half a top dressing of stable dung. I have repeated the plaister three or four times; three, four and six bushels to the acre, at intervals of three, four and five years. I should have preferred ploughing, had it been convenient, as, in the second crops, I am often tormented with Indian grass and weeds. But the ground is on a part of my farm, where the hay and pasture are more useful to me, than any other crops. After dressing with dung, I have left a part unplaistered, to compare it with the rest; and always perceived a striking inferiority, where the plaister was not strewed. I once repeated the plaister on a part of it, without previously dunging, after it had been mowed several years, from the time it was first plaistered. The plaister seemed to have no effect. But on applying a slight dressing of dung the next year, this part was equally good with the rest.*(s)* This lot is

(s) I have notwithstanding this instance, frequently plaistered here and in other parts of my farm, and succeeded well without dung; but never in the degree I have perceived with dung. I must be understood here to mean, a repetition of the plaister. For in the first application, it has generally thrown up as great a burthen, as any combination could produce.

now in excellent common grass; intermixed with red and white clover, and some blue grass—parts of it much layed, owing to the wet season.

I have, from this and many other occurrences, long been of opinion, that the plaister must come in contact with some animal or vegetable manures, or putrefied substances,*(t)* to give it its proper efficacy.

(t) "Charcoal or carbon *exists ready formed in vegetables. Chaptal* 36, 37."

Although Chaptal, page 452, asserts, that "we see the vegetable almost entirely formed of *hydrogene*, he, in the the same page says "the *nitrogenous gas* (and he afterwards adds the *carbonic acid)* more particularly *serves them for aliment.* "Hence it arises that vegetation is more vigorous when *a greater quantity of these bodies which afford this gas, are presented to the plant;* these *are animals or vegetables in a state of putrefaction.* "*Carbonic acid* predominates in the *fungus, and other subterraneous plants.*" Page 453. Ingenhausz on the food of plants, 6. "*All manures, principally dung*, produces a great quantity of the *carbonic acid*, either by itself, or by decomposing the air in contact with it." Hassenfratz asserts, that the *brown sediment of dung* is *carbone.* And Ingenhausz, though he does not exactly agree with Hassenfratz, allows that this brown sediment may become *carbone* by ignition. It appears then that the *gases*, which are the food of plants, according to the present theory, exist in vegetables ready formed; and in animal or vegetable substances

[*See note (r).*] And when so connected, a small quantity of such manures or substances will give it activity. The auxiliaries necessary to draw forth the powers of the plaister, are within the reach of every farmer, of common industry and moderate capacity. The first application, without other assistance than that it finds in the earth, from the decayed and decaying roots, and other vegetable substances, will throw him up forage, and enable him to increase his stock. The more stock, the more animal manure for summer or winter crops, preparatory to the repetition of plaister, with clover. The green manures only cost the seed which produces them. With these auxiliaries, I am satisfied, by actual and long experience, that the gypsum may be repeated as safely, and with more benefit and less expence, than can any other manure, *on soils suitable for its application*—a circumstance which ought always to be kept in view.

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in a state of putrefaction. It also is before shewn, that the *vitriolic acid* in plaister, disengages from the substances containing, them, *all the gases*.* This theory, therefore explains and coroborates the fact—that the plaister operates with most power, when it finds animal or vegetable putrefactions (*dung*, *buckwheat ploughed in*, &c. &c.) in the earth in which it is strewed. It, of course, shews why it will not operate at all, when the animal or vegetable substances, or other bodies containing the gases, *are not* in places where it is strewed.

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*And no doubt it finds in the earth chemical agents (whatever they may be) which by superior affinities decompose the gypsum, and set the sulphuric acid free, to perform its operations.

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In fine, I continue, after long and various experience, in the free and extensive use of plaister. I have been often disappointed, in the expected results of my numerous applications of this generally powerful, sometimes fugacious, and frequently ungovernable stimulant.*(u)* But I have been successful in the far greater proportion, of my practice and experiments.

RICHARD PETERS.

Belmont 30th May 1796.

(u) I can with a tolerable degree of certainty, from the appearance of an over luxuriant crop of clover, tell when it is about to quit me. When the plaister ceases its operation, the clover departs with it, being overcome by twitch or other noxious grasses or weeds. It perishes in consequence of too violent efforts. Its fate is similar to that of an individual, who by living too fast accelerates death. I account for the phenomenon, of the sudden exit of the operative powers of the gyps, by its having prematurely decomposed the substances containing the principles of vegetation; and having exhausted those principles in too short a time. In the violence of these operations it excites a vigorous, but fatal vegetation; which, like the exertions of one in the paroxisms of fever, puts on the semblance of strength, but, in fact, is only a prelude to dissolution. There is no guard against this misfortune, but the practice of sowing small quantities, and frequent repetition. This mode I like the better, the more I experience it.

POSTSCRIPT.

I submit the following conjectural remarks, and their application to the agricultural facts to which they refer, to the judgment of those who are better informed than I am, on chemical subjects, with which I profess to have no more than a very slight acquaintance.

R. P.

"IN 1755, Dr. Black, of Edinburgh, advanced, that limestone contains much air, of a different nature from common air. He affirmed, that the disengagement of this air converted it into *lime;* and, that by the restoration of this air, calcareous stone was regenerated." Dr. M'Bride, Mr. Jacquin, and Dr. Priestly, are quoted, as having confirmed this doctrine by experiment. "This was then known by the name of *fixed air*. In 1772, Bergman proved *that it was an acid.*" It has since been distinguished by various names; "and, as soon as it was proved to consist of a combination of oxygene and carbone, or pure charcoal, the name of *carbonic acid* was appropriated to it." Chaptal's Chemistry, vol. 1, page 212.

It appears then, that the crude limestone contains the air (in a proportion of 40-100) which is said, by Ingenhausz, to be the *food of plants*. When it becomes *lime*, it is deprived of this air, till it is slacked or *effete*, and then it recovers the fixed air sufficiently to act as a manure.

It should seem, that it is for this reason, that we find plaister to operate favourably on limed land. The *sulphuric acid* in the gyps, finds the carbonic or fixed air in the lime, which it disengages; and puts in a state to act, with increased vigour, on the grass.

Although the chemists do not allow that *gyps*, like limestone, contains *fixed air*, yet it may have the faculty of communicating to the plant, by operating on other substances, the *carbonic acid*, or whatever be its food. In Chaptal, page 186, it appears that 100 parts of gypsum contain 30 of *sulphuric* acid, 32 of *pure earth*, and 38 *water. It loses* 20 *per cent by calcination.* In other experiments, a greater quantity of sulphuric acid is found, according to the plaister assayed. This analysis excludes *fixed air*, from this substance. It could not reside with the *sulphuric* (vitriolic) *acid*, but would be expelled in *a state of gas.*

If Ingenhausz's ideas, of the almost magical powers of the *oil of vitriol* (sulphuric acid) on vegetation, be just, in any important degree, *the* SULPHURIC ACID *may be considered, either in itself*, or *as it sets other agents at work*, THE MAIN SPRING OF OPERATION IN PLAISTER. It is commonly used, by chemists, to separate the *carbonic*, and all other acids, from their combinations, wherever they are found. The earth, according to the theories before stated, is constantly filled with the *carbonic acid*, by furnishing *carbone* to the air it inhales. It is found in calcareous substances, with which, in great varieties, the earth abounds: it exists in, or is produced by, the roots of decaying or decayed vegetables, trees, and all animal or vegetable manures. I therefore think it a corollary fairly to be drawn from this theory, and the actual analysis of the *gyps*, that it is THIS SULPHURIC OR VITRIOLIC ACID WHICH CONSTITUTES ITS OPERATIVE PRINCIPLE; and that, though it may in itself (nor is lime) be no manure, yet, when scattered on the earth, it decomposes all sub-

stances in which the fixed air, or carbonic acid, is found. It releases this, from the bodies impregnated with it; and, by putting in a state of activity, prepares it to enter the plants, and become their food, in combination with whatever else is necessary, to their existence and growth.

Why the plaister is applied, with greater profit on *light*, than on *clay*, or other wet soils, it is difficult to account. It may, possibly, be owing to the different materials it finds to operate upon. Most *clays* have a great proportion of *iron*, in their composition.—Chaptal, page 214, [Philadelphia edition.] They are so retentive of moisture, that they are generally cold, wet, and sour. The *sulphuric acid*, when poured on *iron* or zinc, by decomposition of water, produces the *hydrogenous gas*, or *inflammable*, and *not fixed, air*, or *carbonic acid*. Chaptal, Page 61. *Clays*, and all wet soils have so much redundant moisture, that (by means of the *sulphuric acid* in the plaister, operating on the iron they contain) they afford an overcharge of *hydrogene*. The *hydrogene*, according to Chaptal, page 97, fixes itself *in vegetables*, though it is otherwise *in metals*, &c. while the *oxygen*, or *vital air*, necessary to be combined with it, as a nutrition to plants, is disengaged and escapes. Thus the *inflammable air*, being left alone, and in too great a quantity, either does nothing, or injures vegetation. This *inflammable air* may, in small portions, in combination with *oxygen*, or *carbonic acid*, be, as Chaptal asserts it is, an ingredient in the food. But when in great quantities, and *of itself*, it may be destructive. In light soils, the water and moisture are soon drained away. But the plaister counteracts the percolating, or porous, qualities of these soils, by attracting, arresting and retaining as much moisture (and perhaps no greater quantity) as will answer all beneficial purposes. The superfluous water or moisture passes off. And thus the operative principle in the plaister produces no more, either of *inflammable*, or *fixed air*, than is necessary for the salutary supply of the plant. A shorter

and perhaps a better explanation, is, that in clay soils there is little or no *calcareous earth*, on which the plaister always operates the most favourably; as it finds, in these earths, the *carbonic acid* in the greatest plenty.

Dr. Priestly, in a conversation I lately had with him, told me, he was preparing to analyze the gyps; with a view to farther discoveries of its nature and properties, both chemical and agricultural. I wait, with much curiosity, to know the result of the experiments, of this able chemist and venerable philosopher. I am aware, that the doctor's opinions, and those of the followers of Lavoisiere, in several points, differ very materially. I am neither qualified, nor inclined, to determine which are right; though I have ventured to make deductions, perhaps too hastily, from some of the new chemical theories. The Doctor asserts, that "some plants are chiefly nourished by *hydrogene* or *inflammable air*, such as the willow, &c." We see aquatic plants coarse, strong, and capable of being sustained (if so they are) by air which is found the most plentifully in wet grounds, where no tender plants, the occupants of dry soils, will grow. The air, nutritive to the one, may be poison to the other. Clover will not grow well in wet grounds, nor will plaister operate there; so that clover and plaister seem to be made for each other. The Doctor thinks, that the *inflammable principle* is the prevalent part of the nourishment of plants; and that they thrive the best in *vitiated* or phlogisticated air. It will be seen how much other eminent men differ with him, by what has been said by Ingenhausz, &c. The Doctor's opinion of the *carbonic acid* being injurious to plants, is not in unison with that of Ingenhausz, Kirwan, and others. In Chaptal, page 117, vol. 1, it is said, "The carbonic acid is improper for vegetation; Dr. Priestly, having kept the roots of several plants in water impregnated with the *carbonic acid*, observed that they all perished; and in those instances where plants are observed to vegetate in water, or in air which

contains this *gas*, *the quantity of gas is very small.*" Practical farmers know, that an overcharge of any manure is destructive. I have killed plants with *dung water*, too highly impregnated; but have forwarded their growth surprisingly, with water moderately infused with dung. May not the water mentioned by Dr. P. have been too highly impregnated with the carbonic acid, when it destroyed the plants? It is allowed, that plants vegetated in such water, when "*the quantity of gas is very small.*" Nature has provided, that plants shall, in ordinary operations, imbibe no more of their food than is proper for them. In extraordinary instances, a plant may, like an intemperate animal, be gorged with food, and, fall a sacrifice to excess. It may be, too, that *carbonic acid* is only a part of the food; and requires to be corrected or aided by some other ingredients, to produce salutary effects. Ingenhausz allows that "*Plants die in pure carbonic acid.*" He says, *oxygene*, or pure respirable air, and heat, are necessary to vegetation. [*Vide Ingenhausz on food of plants, pages* 9, 10, 11.] Plants absorb mephitic or phlogisticated air, and emit vital air. Man, on the contrary, is kept alive by vital air, and emits mephitic. *Chaptal vol.* 1, *page* 117. But Ingenhausz [food of plants page 6.] pointedly asserts, that, "all airs, which cannot be easily changed or decomposed into *fixed air*, as possessing no oxygene, are true poisons to plants, such as *inflammable air*, *putrid air*, and *azote*, contrary to Dr. Priestly and Mr. Scheele. He further says, that all "other airs poisonous to vegetable life, are also destructive of animal life." Such is even the *carbonic acid*, concentrated, or without a great proportion of respirable air.

When I began to extract the accounts of the latest writers on chemistry, the food of plants, &c., it was under the idea, that the *gypsum* would be found to contain this food. Be this as it may, the theories I have mentioned may possibly afford amusement, if they are of no real use, to those who have not access to the works of the writers, who entertain, on this

subject, the current opinions of the day. These, like the doctrine of phlogiston, though once held to be so strictly orthodox, may, ere long, become apocryphal; and be placed, by future reformers in chemistry, among the lumber of the schools. Something useful, however, is always added to the common stock of knowledge and improvement, by the theories of ingenious and scientific men. Yet, after all, the farmer will find *his fields* the most convenient *laboratories*; his *instruments*, *of husbandry*, his safest, most simple and intelligible *apparatus*; his crops his most instructive expositors; and *experience* his most faithful and unerring guide.

As our practical results and opinions, differ with the account of the gypsum, given in the "outlines of a proposed general report from the (British) board of agriculture, on the subject of manures; printed last year in London, and transmitted here by *Sir John Sinclair*, I think it best to publish that account. It is the most recent, I have seen from England, on that subject. In the same report, there is a detail of experiments by a *Mr. Smythe*, of Kent, too long to insert here; but very favourable to plaister, on sainfoin and clover. By this it appears, that they are little advanced in the knowledge of the uses of plaister, though a desire to use it begins to increase among their farmers; who, like most of those of all countries, will not believe till they see. *Mr. Smythe's* experiments were on light loams, and poor calcareous soils; the chalky soils particularly. A friend of his tried it on *clay*, and failed. Nor had it effect, with him, on grass; I suppose he means, other than sainfoin or clover. Nor on *corn*, or turnips. *Wheat* is there called *corn*.

GYPSUM.

"THIS article has hitherto been little used in Britain, as a manure, and, in the instances where it has been employed, the accounts of its value are very contradictory; in some cases it has been represented as producing astonishing effects; in others no visible advantage has been derived from it, and in several instances it has done mischief.* Before we enter into any discussion upon the subject, it will be necessary to state, that gypsum consists of a mineral acid, joined

* I wish it had been mentioned what "mischief?" I never knew it to do harm, even where it did no good.

R. P.

November 1810.

to a calcareous earth. This acid is well known to be *as unfriendly to vegetation, as calcareous earth is favourable to it*, and, *upon the proportion of it contained in gypsum, the value of that article, as a manure, depends.*

When calcareous earth is added to any of the acids, they unite, and compose earthy salts, differently named, according to the acid made use of. If this compound contains a due proportion of the acid and the calcareous earth, it is said to be neutralized; but if either the acid or the calcareous earth predominate, the compound then possesses acid, or earthy properties.

We suppose, therefore, that, in cases where calcareous earth is the prevailing principle in gypsum, its beneficial effects as a manure will be visible, because in that case, *a portion of the earth will not be united with the acid*, and *will therefore be left at liberty to act upon the soil.*

In cases where these two ingredients are equally balanced, the compound posseses very little solubility in water. It is, perhaps, in these cases where it produces little effect; nor is it possible it can; because unless *the parts of any substance are soluble in water*, they generally can produce no effect on vegetation.

Lastly, where the acid predominates in gypsum, of which, however, we recollect no instances, its mischie-

Since this publication, the gypsum is used in England to profitable account. Its properties are better understood and I believe, the use of it is much encouraged. How whimsical and inapplicable is this theory! when we compare it with *facts generally known here.*

September, 1810.

R. P.

vous effects will be visible, *as acids of all sorts are inimical to vegetation.*

In this way we account for the different effects produced by gypsum, and also for the gypsum, brought from certain places, being more valuable than that brought from others. In many cases its value will depend upon its containing more calcareous earth than acid. Upon lands, therefore, where no stimulating substance has been applied, and which contain little or no calcareous earth in themselves, this sort of gypsum will be a good manure; accordingly, in America, where the soil in most places is composed almost entirely of vegetable earth, arising from the decayed herbage, and the deciduous parts of the trees which have grown and decayed there since the creation, and *where scarcely a particle of calcareous earth is to be met with*, this sort of gypsum will stimulate the soil, and produce good effects; even in this country, upon virgin soils, which contain no principles of that sort, its effects will be similar; *but upon lands which have been long in a state of cultivation*, which have been frequently *manured with substances containing much alkaline matter*, or which *have received a due proportion of calcareous earth*, its effects will not be perceptible, unless an enormous quantity be used. But in cases where the acid prevails, its bad effects will be visible at once. In all cases, therefore, where gypsum is intended to be used, *it ought to be a matter of serious inquiry, first, whether the land has been previously limed?* and next, whether the acid or calcareous earth prevails in its composition? If the land possesses in itself no calcareous matter, the gypsum, which contains most of it,

will produce good effects; but in all cases where the acid prevails, it will certainly do harm.

"This account of the nature of gypsum we are enabled to give, from having carefully examined different sorts of it. In some of these the calcareous earth prevailed; and in others the substance was a neutral compound. We pronounce, therefore, that in all cases where the calcareous earth prevails in gypsum, *it will be useful, if the ground has not been previously limed.*

In cases where the acid and earth are equally balanced, it will have other effects.

And *in cases where the acid prevails*, it will *uniformly do harm;* unless, perhaps *upon chalk or limestone lands.*

It is therefore a manure that can seldom be used with advantage in this country upon arable lands, as there are few situations indeed in which the soil does not either contain calcareous matter in itself or has received it as a manure."

OBSERVATIONS.

THE writer of this article is misinformed when he says that "*in America scarcely a particle of calcareous earth is to be found.*" We have enough of it, mixed with a great variety of substances. Our attention has not been sufficiently paid to subterraneous explorations, to enable us accurately to class or designate the several species, either of those unmixed, or in combination. We know most about the argillaceous (clayey) earths, because we have had them more in use, and they are more common. This account of gypsum, as to its agri-

cultural uses, seems to be founded in mere theory. For we find *by experience*, of which *theory* is only the pupil:

1. That the gyps succeeds *on limed land*, quite as well as on that not limed; and some think better.

2. Although we never analyze chemically, to know the balance between the *acid* and the *calcareous earth* in our plaister, we find that the gyps, out of the same parcel, does as well on *limed*, as on other land, let whatever parts of the substance prevail in its composition.

3. As to its alleged disagreement with *alkalis*, we do not find this, by any means, founded in fact. I have plaistered land previously manured with soap boilers ashes, and it has not only done well, but I think has had remarkable success. 'Tis true these ashes are mixed with lime, and the alkali weakened by lixivation. But General Hand has placed the fact beyond a doubt. See pages 30, 31. He strewed ten or twelve bushels of (wood) ashes to the acre, which is much more than I ever strew per acre, for grass. The plaister, he states, *had more effect, than it had on ground dressed with other manure.* Why it is so, is not of so much consequence, as the fact itself. But if the foregoing theory were pursued, we should find encouragement from the properties of *alkalis.* Chaptal, pages 115, 119, 120, [Philadelphia edition] "all alkalis contain *carbonic acid* and are considered as *carbonates. Hydrogene* and *nitrogene gas* may be produced from *mineral;* and *carbonic*, from *all alkalis.*" In other chemical writers it appears, that the salt found in *ashes*, may be purified, so as to contain half its weight of *fixed air.* Beside that it may be presumed that *vegetable* alkalis furnish the most *carbone*, it appears, that in both *mineral* and *vegetable alkalis*, the

sulphuric acid, in the plaister, finds sufficient materials to set in motion, for the nutrition of plants.*

4. Mere matter of opinion is no proof: but it seems most likely that the *acid* (vitrolic salt) in the plaister, is most *soluble in water*, though the earth be also soluble—and, (if this be the criterion,) that it is the *acid*, more than the *calcareous earth*, which produces the effect. But I still conceive this effect is produced by the acid operating on other substances, and not immediately on the plant. If it be the calcareous earth, why do not other calcareous earths operate in a similar degree? It would take an immense proportion of other calcareous earths, to do what is here *supposed* to be effected by a small quantity in the plaister. *Crude limestone*, pulverized, has a considerable effect on grass grounds. But it takes so much of it, as to preclude, by the expense of obtaining, the profit of using it. Broken or powdered *oyster shells*, (which contain calcareous matter as well as salt) are excellent for grass grounds. But their powers bear no reasonable proportion to those of the plaister. *Limestone gravel* is pulverized, in some

* Since these observations were made, I have tried a great variety of experiments, with lime and ashes respectively, in large and small quantities, on land. I have, in no instance, found, that the English theory could be justified. On the contrary, the plaister has frequently drawn forth the powers of both the lime and ashes, and corrected them when too much, or assisted, when too little, of either of the latter, had been spread on the field.

R. P.

September, 1810.

countries, and used as a top dressing. But the quantity necessary is enormous, compared with that of the plaister.

5. There is no country where limestone lands are to be found in greater proportion, than in this. I know many farmers of limestone lands, who use plaister. The results of their practice, much the same with those on other soils. It depends on the texture and staple, of the upper stratum of soil. Limestone is here found under *clay*, *loam*, and *sand*. In our coal countries, generally under *clay*. It is curious to observe the general uniformity of the strata, in our western country, beyond the mountains; where in many parts, they scarcely ever sink a well, without finding *clay*, *coal*, *limestone*, and *freestone*, or *slate*, in strata, each of from four to six feet thick. The *clay* is generally on the surface, but it frequently happens otherwise.

6. By a recurrence to the facts in the foregoing collection, it will appear, that the idea of plaister not being beneficial, where *lands have been long under cultivation*, is unfounded. Mr. Robert's lands have been cleared 90 or 100 years. Some of mine above 60, Mr. Sellers's is an old farm, and so are those of Mr. Duffield and Mr. Price.

I have lately been informed, in a letter from Robert Barclay Esq. of London, a worthy member of our society, that plaister succeeds in some parts of *England;* where it has been used with various success; and often, in that kingdom, without any benefit. Mr. Barclay writes, under date of 31st July, 1810.——

"Many years since, I republished your tract on the use of *gypsum;* which had the effect to cause many experiments to be made; but generally with little success.—However Mr. H. *Smith (or Smythe)* a respectable experimental farmer, near *Feversham* in *Kent*, has fortunately succeeded, *on a calcareous soil.* He assures me, that there are above SIX THOUSAND ACRES under plaister, in his vicinage. He received the gold, or silver medal, from our society of arts and sciences."

It will be seen that we have as much success here on other soils, as we experience on those mixed with *calcareous* matter. The vegetable or animal substances, found in the earth by the plaister, are here the causes of its efficacy. Probably this is the same Mr. *Smythe* before mentioned. It seems strange, that, in England, the plaister agrees with calcareous matter in the earth, and yet, there, it is said not to agree with *lime;* the basis whereof is calcareous matter.

RICHARD PETERS.

October, 1810.

SINCE the foregoing collection has been in the press, I have been informed, but do not vouch for the fact, that *plaister* has a considerable effect in preventing the fly from injuring wheat. Whether, like a successful medicine, when much in vogue, the gyps is imagined to be a *panacea*, and good for every thing; or whether there be really foundation for this information, I cannot determine: but it is well worth inquiry. We know that some things are offensive to vermin, and drive them away; and others destroy them. One or the other of these results (if it be of any use at all in this particular) may flow from strewing plaister on *winter grain.*

I have thoughts of trying the following experiments, on my wheat fields; as the fly is among us. But I have not fixed on the time;—whether it shall be in the season when the old fly deposits its eggs, i. e. soon after the wheat is sown in the autumn; or in the spring, so as to destroy, or drive off, the young brood, as they are produced from the eggs. Perhaps it will be right to try the experiments in both seasons.

None of these to be so powerful as to injure the grain.

1. Brine two lands with salt and water, or sow common salt thereon.
2. On two other lands, plaister of Paris.
3. On two other lands, soot, and a small proportion of sulphur.
4. On two others, lime just slacked.

5. On two others, ashes or lye.

The common salt must be applied at a distance from the gyps; plaister does not succeed on sea coasts, where the air is always impregnated with sea salt. This salt and that in plaister, by operating on each other, may change the qualities of both. *Sulphuric acid* forms *sulphat of soda*, or *glauber salts*, by decomposing marine salt, and combining with the soda. *Glauber salts*, and all compounds containing *sulphuric acid*, are manures, or auxiliaries to vegetation: but are not so effectual or cheap as the gypsum. The small quantities required of the latter, and its rapid decomposition, will always give it the preference.

R. P.

6. Sprinkle, on two other lands, water, in which *oil* of *vitriol* is dissolved: this water will kill, or banish, bugs, flies, and other insects, from bedsteads, walls, &c., in our houses. If the plaister is an enemy to the fly, it is probably by means of its *vitrolic acid.* If this could be proved by experience, Ingenhausz would render essential service, by his theory of the *oil of vitriol.*

It would be well, if several farmers were to try some experiments of this sort; though at first they may seem whimsical. My fields, generally plaistered on the wheat, or on preceding crops of grain and clover, have been little infested by the fly. But I have attributed the safety of my wheat, to good tilth and manure. So that the crop may be sown late, and the ground throw up strong and vigorous plants, which resist the fly, when

starved stalks, and grain sown early, fall sacrifices.* There is something, too, in the species of wheat sown.

R. P.

* I have tried these experiments; but have not been able to ascertain accurately the effects; owing, probably, to my escaping from the ravages of the fly. From their disinclination to furnish facts, or try experiments, I know not what has been done by other farmers.

R. P.

October, 1810.

EXPLANATIONS *of some of the* TERMS *used in the foregoing sheets.*

ACID, a combination of vital air, with certain elementary substances; such as—nitric, sulphuric, muriatic, carbonic, &c. *Acid* comprehends all qualities of such combinations, *sourness* and *causticity* inclusive.

ALKALI, one of the divisions of salts, comprehending that class of chemical elements, which uniting with acids form *perfect neutrals*; in opposition to the salts formed of acids with metals *or earths; which are called imperfect.*

CARBONE, charcoal.

DEPHLOGISTICATED, purified, by being deprived of mephitic, or phlogisticated, qualities.

GAS, all aerial fluids, except of common air—The ebulition attending the expulsion of elastic fluids, from substances fermenting, or effervescing.

HYDROGENE, inflammable air.—With this balloons are filled.

NITROGENE GAS, AZOTE, or ATMOSPHERICAL MEPHITIS, PHLOGISTICATED AIR; corrupted air, which has served the purposes of combustion, or respiration.

OXYGENE, vital air—the basis of all acids—discovered by Dr. *Priestly* in 1774. It always exists in combination, and cannot be obtained in purity, without decomposition. The atmospheric air we breathe, has 72 parts of *nitrogene gas*, and only 28 of oxygene. These modifications are so necessary, that without them we could not live. If we were to to respire *vital air*, in its state of purity, it would quickly consume our life. This virgin air is no more suited to our existence, than distilled water. *Chaptal*, 82, 84. Thus we see that both plants and animals require combinations; and do not exist in, or by, any air totally unmixed.

PHLOGISTON, the principle of inflammability.

MEPHITIC, ill savoured, noxious, poisonous air. The sweetest flowers and fruits, always exhale this mortal poison. Hence the danger of laying in close apartments, wherein even an inconsiderable number of flowers are placed. Sudden deaths are not rarely the consequences of such mistaken gratifications; to which many persons have fallen sacrifices: thereby fatally depriving Mr. *Pope's* ridicule of its sting; by proving that the strongest man, as well the most delicate of the sex, may—

"Die of a rose—of aromatic pain."

See *Ingenhausz expérience sur les végétaux.* Pages 67, 68.

Improvement by Plaister; in LOUDON COUNTY, VIRGINIA.

Since the foregoing compilation was put to press, and too late to embody them into the little work, I have received, through the favour of *William Noland Esq.*, a collection of FACTS, relative to the improvements in the agriculture of LOUDON COUNTY, in Virginia. The plaister of Paris has *created*, in that county, an entire renovation of their soil; which was worn out by long cultivation, and bad systems. Much of it was not originally of the first quality; their bottom lands excepted. I do not find any contradiction; but, on the contrary a complete confirmation, of the facts and principles endeavoured to be established, in the publication herein reprinted. The use of the *gyps* began, in that county, about twenty years ago. The difficulties attending its introduction, were, in a degree, similar to those prevailing here, in the infancy of this great auxiliary to our agricultural prosperity. Its progress was more rapid, when conviction followed a few practical proofs. *Now*, their zeal is greater than that existing here. They have the most solid reasons, for entertaining the highest opinion of the capacities of the plaister. It has substituted plenty and comfort, in place of want, or scanty subsistence. Their lands have, in many instances, quadrupled in value, their stocks of domestic animals have wonderfully increased, and their barns and granaries are filled. Such instances of rural prosperity, excite in me sensations inexpressibly delightful!

I do not discover any doubts on the subject of its constantly ameliorating, instead of exhausting, the soil. On the contrary, some of the facts are stronger in favour of amelioration, than in my experience I have perceived. Some allege that ground long plaistered ploughs *tough:* so we often find it. The general opinion seems to be, that its application in small quantities, even as low as half a bushel to the acre, and frequent repetitions, are best. They are much in the habit of *rolling* all their grain, for seed, in plaister. Their times of application of top-dressings, are, in general, the same with ours. Many prefer *covering* the plaister, after spreading it over the whole field, in quantities of from one to two and an half bushels per acre. There is an instance of plaistering half a field of Indian corn *when in tassel*, and its producing double the number of barrels of of corn, compared with the crop in the unplaistered moiety. On *clover* they esteem it most efficacious, but they speak favorably of its effects on any kind of grass, or grain; and find its efficacy increased by a small application of dung. They find, that seed potatoes cut and plaistered, produce more abundantly. I have experienced the same effect. Lands producing, in their exhausted state, only seven bushels of corn, and five of wheat to the acre, have been made, by plaister alone with clover crops, to bring 40 bushels of the former, and 30 of the latter, per acre; and their fertility remains on the advance. They mix various quantities of plaister with their seed grain; from an half to a bushel of gypsum, to 5 and 6 bushels of grain. The grain is, as is done by us, wetted or soaked previously. Some of the *Loudon* farmers think, as I do, that top dressing with plaister on wheat

does little service, if any; but they all concur in the efficacy of rolling the seed. Those apparently of the most accurate observation, believe, that courses of clover crops plaistered, so ameliorate the soil, that the following grain crops, *in this way* receive their advantages.

One of Mr. *Noland's* correspondents observes;—"the valuable properties of plaister are so well established in this neighbourhood, that you might as well ask a man if bread and meat were of any use to a labourer, as to ask him if plaister is of any use to his land. He would answer the one as quickly as the other, in the affirmative. If land is for sale, the only object seems whether it lies well, and is well watered. Its being poor or rich, makes but very little difference in the price; as it is so well known that one course of red clover, well plaistered for one or two years, puts the ground in good heart for any crop."

In fact, the *clover husbandry*, with its almost magical adjunct—the plaister, does every thing for exhausted lands; and much for any other soils. No other grasses can compete with it, for prompt amelioration. I see with pain, (because it discourages the clover-system) prejudices growing against *clover-hay*. For 20 years, I used but a small proportion of any other, and I never, during that period, had a sick horse. I generally salted the hay, while it was stowing in the stack, or mow; and was content with moderate crops, cut in due season, and carefully made; though I could have had, by forcing or overgrowing, a greater burthen. In the winter I often damped, either with water alone, or weak pickle, over night, what was to be used next day. For *horses*, in careless hands, other hay may be better. But the cha-

racter of clover-hay is injured by the inordinate desire of getting too heavy crops, which are never sweet nor maturated; and, at the root, the grass of such crops is always feculent, and often rotten. The seller may gain by two, three, and often more, tons to the acre at a cutting; but neither the buyer, nor the farmer who consumes it, is equally benefitted. Horses reject, or suffer by, such over-luxuriant crops; and, being rank, coarse, and often leafless, cattle waste a great proportion of them.

For milch-cows in winter, no other hay is equal to good well cured clover. I have often tried the comparative merits, in this way, of clover and the best of other hay. The complaint, that it wastes, and is injurious to horses, is owing to its over luxuriance, and bad curing; and not to any unwholesome qualities, in the plant. Every one of experience knows, that too heavy crops of any grass, never turn out wholesome, sweet, and profitable, in the consumption.*

Mr. NOLAND's correspondents were *Leven Powell*, *James Heaton*, *Mahlon Taylor*, *George Taverner*, *Bernard Taylor*, *Robert Braden*, *James Moore*, *and Abel Jenners:*—all respectable citizens, and practical farmers, of *Loudon* county; and well acquainted with the general state of agriculture therein. He had the like difficulties in procuring information, with those constantly experienced here.

* The idea that clover (plaistered or not) more than other grass, has a tendency to produce the running at the mouth of horses or cattle is unfounded. See vol. 1, of agricultural memoirs, pages 167, 8. I have seen on all grass grounds, in the autumn, with a microscope, numberless *red spiders*, very small. Some say spreading hot lime kills them, and prevents salivary defluxions, from horses and cattle. I cannot ascertain the cause of this unfortunate complaint. I have heard many, but no satisfactory, accounts of its origin, or remedy. *Salt* sometimes checks it; and so does putting the horses, or cattle, to dry forage, or grain. R. P.

Mr. *Noland* informs me, that, about 14 years ago, the late Col. *Clapham* cleared about 20 acres of *new land*, and *ploughed in*, on a part of it, half a bushel to the acre of plaister.* He planted *tobacco* on the part plaistered, sowed also thereon, about half a bushel of plaister to the acre, *broadcast*. There was no appearance of any benefit from the plaister, either on the crop to which it was then applied, or to any succeeding crops since. Mr. *Noland*, with a view to ascertain the effects, if any, on new or *virgin soils*, repeatedly took notice of this piece of land; and has never been able to discern any difference between that, and the adjacent new land unplaistered. An old field of the same original quality, divided from the new land only by a lane, and entirely worn out, was taken up, for experiment, by Col. *Clapham*, and sowed generally with plaister; but stripes were sometimes left

* Great numbers of farmers now harrow in, and some plough in the plaister, and give favourable accounts of their success. My opinion was originally against this practice; but I always distrust my own judgment, when facts, well attested, oppose it. I often now harrow in the plaister on a corn field; and find it highly beneficial. In general I still use it as a top dressing: and never found advantage by *ploughing* it in.

R. P.

unplaistered, for comparison. The crops, especially of Indian corn, plaistered, yielded more than those on his rich bottom land. But when not plaistered, the corn was nearly worthless.

Mr. *Noland's* farm, though adjacent to Col. *Clapham's*, is not so much benefitted by plaister; and especially on Indian corn. Yet, having some years ago a piece of *tobacco*, neglected, overcome by crab grass, and not likely, from its appearance, to come to any thing, he scattered plaister lightly, after dressing them, upon each plant. The success was wonderful, and might be perceived at a great distance. The crop was far superior to *tobacco* unplaistered, on better land. Col. *Clapham* also had similar success with tobacco plaistered; and Mr. *Noland* now constantly plaisters that plant, and never fails to succeed.

Mr. *Abel Jenners*, one of Mr. *Noland's* correspondents, confirms what I have often observed, as to plaister strewed on *clay*. The soil mentioned by Mr. *Jenners*, must be similar to some of that on the *Mount Vernon* estate. General *Washington's* account of his abortive experiments on such soil, will be seen in page 74.

"To your second, I answer,—the first farm I went to live on was very poor;—the soil, a flat, white oak, white, clay,—on which I used the plaister, in various ways; but found no advantage from the use of it. I measured off one acre in an old field, on which I sowed one bushel; and near that a quarter of an acre, on which I sowed another bushel. I viewed this ground

for three succeeding years, and never discovered any difference in the growth at all. I had some *red hills** adjoining my meadow, sowed with red-clover, of which I plaistered a part; and had as visible an effect from it, as ever I had on any ground whatever."

Another correspondent of Mr. N's, who is a friend to rolling the seed, of wheat, or other grain, in plaister, previously to sowing; states, that, "top dressings of plaister, he found not only of no service to winter grain, but he had suffered by the plant being retarded in its ripening the seed (though it was very green, and looked flourishing) so as to be caught by the mildew." The effect seems to be similar to that produced by lime; whatever be the cause. Possibly the mildew occurred from other causes. I never new the plaister *injurious* to any crop. I lost a crop by plaistered *clover*, choaking the *wheat*.

I cannot close the well intentioned, however inadequate, efforts I have made, to establish the reputation, and shew the extensive advantages derived to agriculture, by the use of the subject of the foregoing sheets; without cordially expressing my best thanks, to those who have assisted my endeavours.

To Mr. *Noland* and his correspondents, I am peculiarly indebted; as they are among the few who have complied with my requests, to communicate recent facts, relating to that part of our husbandry, in which

* *Red hills*, are light; sandy, or gravelly.

the *gypsum* is so highly efficient an auxiliary. I lament that circumstances have not permitted the insertion of their letters. I perceive some of them express, though not to me new, yet, very unnecessary apprehensions of exposing themselves to critical animadversions. But the diffusion of agricultural publications is so deplorably limited, that either censure or praise, must be confined to a small circle. *They* would not suffer by candid scrutiny; and all other is mischievous and despicable. Our thanks are due to those who rectify errors; criticisms with this view being grateful and laudable. Our disinterested motives, in giving the best information in our power, must be a shield against, or consolation under, unmerited censure. I regret that my so frequently meeting with this excuse for withholding communications, compels a repetition of such observations. The difficulties attending the collection and diffusion of agricultural information, are only equalled by the arduous, and often fruitless, task, of prevailing on those for whose benefit it is calculated, either to read, believe in, or practice upon, such information. Those who profit by the lessons we endeavour to afford, bestow on us the most grateful eulogy, in the advantages they derive from our desires to serve them. And this is the best, and only, praise we covet.

Whatever apprehensions may be felt, by individuals who *do not* give themselves the trouble of assisting in the diffusion of agricultural knowledge, and the facts on which it is grounded, I have every reason to believe, that those who *do* exert themselves, receive the approbation of all real friends to their country.

So far as our society, and the individuals who compose it, are concerned in the subject, they have no cause to complain. On the contrary, they have been honoured and gratified, by attentions from highly respectable individuals, and societies; both at home, and in foreign countries. They are, and should be, sincerely thankful for these attentions; and rejoice that they are made the instruments (in whatever degree their capacities are competent and useful) of promoting the true and solid interests of their country.

RICHARD PETERS.

November, 1810.

Dear Sir,

Herewith, you will not only receive the Queries (asked for yesterday) but the appendix thereto;— and other productions from the same quarter. Which, when you have done with, be so good as to return. —

These, or some of the Papers, may be of use to a Committee, if Congress should incline to take up the subject of Agriculture. —

Your observations, with the returns of the Papers, will be very acceptable to

Dr Sir Yr Obed. & Affe

10th Dec. 1796 } G. Washington

(Superscribed)

Richd Peters Esq.

H.S. Tanner.

FAC-SIMILE *of General Washington's Hand Writing; and sketches of his* PRIVATE CHARACTER.

It has been suggested to me, by several friends, that a FAC-SIMILE of Gen. Washington's hand writing, would be a curiosity to such as are not acquainted with it; and a pleasing memorial to those who reverence his name and character. I have selected the shortest note I can find, relating to agriculture; and solely on account of its brevity. I cannot lay my hands on letters I received, more appropriate to the topic on which the "Inquiries" are written. He was in the habit of seeking information upon subjects of husbandry and rural affairs; which gratified and amused his few leisure hours. But he became so much engaged in public labours and cares, that I was happy, at all times, to relieve him from the pressure, his *agricultural* correspondence occasioned. A long and sincere love for him, had subsisted from an early period of my life; and he, without ceremony, required the slender assistance I cheerfully rendered. He would (as in matters of greater moment) correct, observe upon, and add to, any draft, or information, with a masterly hand: and on the subject of husbandry, he was peculiarly zealous and intelligent. He generally gave more credit (never less) than they merited, to those who gave him assistance, which his situation necessarily required, in the small, as well as great concerns in which he was constantly occupied. His own mode of expressing his thoughts was (in my opinion) better, than that in which any other person could clothe them. I often thought, that he was not sufficiently conscious of this. His style was formed and perfected, by his own efforts. He began the bright career, which furnishes the first chapter in the history of his public life, at an age, when those who have the opportunities, are finishing a literary education. He had a plain and clear style; natural, and peculiar to himself;

and he wrote with ease, but generally with deliberation. This was, *once*, so well known to me, that I could, most generally, distinguish it, though copied in another hand. Whatever be the fact, of many public papers being wholly or partially written by his able friends, or ministers, as it is naturally to be supposed that they so were; I only speak of what I know. This deducts nothing from his candour, or clearness of judgment. I neither affirm nor deny, any such positions. But this must be allowed; that his selection of papers deservedly celebrated, was a striking evidence of the strength of his mind, and discriminating faculties. An acute lawyer has credit for drafting a perfect instrument; but it is the worth and estimation of the name to the seal, which gives it force, currency, and value. It is an old and well known saying of a British crowned head, when the credit of measures was attributed to the administration; that "a foolish king never chose wise ministers." I cite this observation, not for its royalty, but its consistency with common sense.

I wish to repel any idea of my claiming merit, or importance, from the small assistance I could give him, on any occasion.

If I wanted proofs to fortify my *own convictions* (for I presume not to decide for others) of the truth of my assertions, as to his literary capacities, I could find them plentifully interspersed through more than fifty of his original letters, in his own hand writing, now on my table. They were written, during a course of several years, to confidential friends (the most of them to one on whom he placed much reliance) on the most important, as well as less prominent, occurrences, of the arduous struggle, in which he was so eminently distinguished. No rhetorical flowers, or finery of diction, will be perceived. But they display a clear and correct judgment, a constant and unshaken fortitude, a liberal mind, disinterested patriotism, and extensive views. They prove, invariably, that the achievement of the liberty, union and happiness

of his country, was his undeviating aim; and its independence, his leading-star.

Had I not prescribed to myself bounds, which I will not overleap, I could trace, distinctly, through these letters, the the most prominent features of his farewell address. These do not appear so well matured, or expressed, as they finally were. But the *sentiments* are substantially similar; though some may be said to be in a state of *adolescence;*—if such an expression be allowable.

These letters, if there were none others, would convince any who candidly doubted on the subject, how unnecessary literary assistance to him would have been, for all useful and necessary purposes, had his leisure, or inclinations, permitted him to depend solely on himself. I am not at liberty (nor is it required in this feeble sketch of his *private* character) to adduce passages in frequent proof. I may, however, without regard to this point, and without any nice selection, mention an instance of his rigid adherence to duty, at the expense of his private accommodation and enjoyment. We who passed through the vicissitudes of our revolution, well recollect, that the years 1779 and 1780, were among the most distressful æras, of the variegated progress through our contest. It was in the winter of one of those years, that the occurrence happened, which I have mentioned in volume first, page 232. He was pressed by many personal friends, and particularly by one possessing his confidence, and to whom he addressed one of the letters I have noticed, dated "*Middle Brook*, December 12th, 1778," to spend his winter in *Philadelphia;* where all would join in rendering his time happy, and his situation personally accomodatory. He writes in reply, from the patriotic feelings of his heart;—and without affectedly quoting the inapplicable examples of *Hannibal* and *Capua;*—

"Were I to give into private conveniency and amuse-
"ment, I should not be able to resist the invitations of my

"friends, to make *Philadelphia* (instead of a confined room "or two) my quarters for the winter. But *the affairs of the* "*army* require my constant attention and presence; and, "circumstanced as matters are at this juncture, call for some "degree of care and address, to keep it from crumbling.— "As peace and retirement are my ultimate aim, and the "most pleasing and flattering wish of my soul, every thing "advancive of this end, contributes to my satisfaction; how- "ever difficult and inconvenient in the attainment: and will "reconcile any place, and all circumstances, to my feelings, "whilst I remain in service."

In proof of the goodness and candour of his heart, I extract a part of a letter, dated "*West Point August* 22d, 1779;" to the same confidential friend.

A most disastrous, and nearly ruinous, misfortune, had taken place, at an early period of the war. He, at that distant time, suffered under the reproaches, of some envious, of a few malignant, and of more mistaken, malcontents; for, although posterity may not believe it, such there were.*

* These would, either privately, or openly, censure (among other unjustifiable charges) his *Fabian* policy. I was continually, during all the active years of the war, in a situation to know the exact state of our army, and its strength, deficiencies, wants, or supplies; which I could not, at any time (unofficially) for any purpose, reveal. Without pretensions to military talents, or skill, I was always satisfied, that this policy was our salvation. Although rejoiced when our army was strong in its effectives, and redundant in its supplies; yet I sometimes feared, that zealous patriotism, and professional pride (honourable and appropriate to soldiers, and sufficiently prevalent among our military characters) would urge to pitched battles. Under this idea, I had frequent occasion to draw comfort from misfortune. I thought, when impolitic measures had "crumbled" our army, and thinned its ranks, or withheld its supplies; that, shielded by the guardianship of heaven, our weakness was our strength. If this had been substantive comfort, and not consolation derived from necessity, I should have been more and ofner satisfied under it, than I really was. Our weakness and necessities were, very frequently, seriously dangerous and alarming; and the more so, when they were not generally known, or believed. Supineness in the people, as well as in their representatives, was often the perilous consequence.

Many estimable men, both in and out of the army, were uneasy under inactivity; and thought the contest should be brought to a close, by general battles, or more frequent offensive operations. Such anxieties pressed on his patience, but he resisted them firmly; without passing by opportunities, in smaller combats often, and in important enterprises, when necessity, or the magnitude of the object, justified. *Hannibal* and *Fabius* were cast in different moulds. Although the heroism and military skill of the one were indisputable; the patience, wisdom, and forbearance, of the other, saved his country.

But he would not,—unnecessarily for any public purpose,—develope the real state of the transaction. He bore unmerited reflections, patiently and silently. He had suspended his better judgment, in deference to the opinions of others (good and true men) with whom his situation compelled him to advise. A resolution of Congress, too, was indirectly justificatory of the advice which produced hesitation, as to his peremptorily enforcing his own opinion. This he calls "a foible." He had given plain and explicit orders; but he had left the time and manner of execution, in a degree, discretionary. Yet the disobedience of an able and worthy general officer (who afterwards became eminent, and deservedly distinguished) was strictly unjustifiable. The disaster was heavy, and irretrievable. The error flowed from well intentioned motives; and the character of the officer was unimpeachable. He thus writes, in the letter cited:—"But this concern received ad- "ditional poignancy, from two considerations which were "but little known,—and one of them never will be known "to the world;—because I never shall attempt *to palliate* "*my own foibles, by exposing the error of another.* Nor in- "deed could either of them come before the public; unless "there had been such a charge, as must have rendered an "inquiry into the causes of this miscarriage necessary."

Those only who knew his *private life*, had the complete opportunity and gratification, of admiring his private virtues;

On the subject of his cautious, and finally successful conduct (mistakenly, and sometimes malevolently, turned against him) he writes, in a letter, dated from "*Middle Brook*, June 23d 1777; "We have some among us, who wish to make themselves popular at the expense of others; or "*who think the cause is not to be advanced otherwise than by fighting.* The peculiar circumstances "under which it is to be done, and the consequences which may follow, are objects too trivial for "their attention. But as I have one great end in view, I shall, maugre all the strokes of this kind, "steadily pursue the means, which, in my judgment, lead to the accomplishment of it. Not doubting, but that the candid part of mankind, if they are convinced of my integrity, will make proper "allowances for my inexperience and frailties. I will agree to be loaded with all the obloquy they "can bestow, if I commit a wilful mistake."

It is well known,—and he mentions it in several of these letters—that nothing but a sense of duty, and the universal wishes of his country, induced him to accept his arduous, thorny, and highly responsible appointment.

and unassuming, though unaffectedly dignified, manners. He had been engaged in so many difficult and important transactions through his life, that he had acquired an habitual thoughtfulness, which gave a pensive cast to his features. But no person more relished cheerfulness, pleasantry, and disengaged conversation, when his undeviating attention to business and affairs, permitted relaxation. I mention this to shew, that his character in this respect has been, by many, mistaken; and that he was not, in his disposition, gloomy, or saturnine. His countenance would brighten, and light up, with cheerful and innocent pleasantry;—but no person ever saw, in *his* features, depression, despondency, or want of equanimity, under the severest embarrassments and disasters; which were, at frequent periods in our revolutionary affairs, but too common. Correct in his religious opinions, he was exemplary in the unostentatious performance of his religious duties. Always, and openly, acknowledging in prosperity, the favours and blessings of the omnipotent and benevolent BEING, from whose bounty, life and all its enjoyments are derived; he was submissive to his will in adversity. No unreasonable, or boasting, exultation, was ever perceived in his conduct, expressions, or correspondence, in military success; nor did any querulous or unworthy bewailings appear, under defeat or disappointment. Yet he was neither insensible to the one, nor callous under the other.*

*His magnanimity under misfortune, was uniformly observed. But the pleasure he received, on any great event favourable to his country, was at once perceived. A distinguished veteran of our revolution, lately informed me, that, after the battle of Germantown, the American army had retired, up the Skippack road, 18 or 20 miles from Philadelphia; and my informant was at head quarters, when a letter arrived announcing the capture of General Burgoyne's army. It was put into General *Washington's* hands to read; it being a private letter. The General's sensibilities were so excited, and he was so deeply affected with the importance of the intelligence, and the great advantages derived from it, that he returned the letter to Col. *Palfrey*, who had presented it to him (being himself unable to proceed) and desired him to finish it. My worthy old patriot and friend, observed to me, with much emphasis;—"Here were displayed the strong feelings of genuine patriotism! of a mind incapable of envy;—transported with joy at a victory, the honour of which would be another's; but "which gave earnest of eventual success, in the great object of the war!"

I have often compared notes, with many who were frequently with him. I never met with one who said he could approach him, without some symptoms of insuperable and respectful formality; involuntarily transferring their own feelings, to his character: and yet he had nothing chilling or repulsive in his manner, or countenance; on the contrary, his demeanor was polite and inviting. Though cautious and circumspect, in great as well as smaller concerns, he was guileless and candid. He was accurate, methodical, but always inflexibly just, and often minute, in pecuniary and other arrangements, calling for this kind of attention.—Yet he was liberal, benevolent, and charitable, when occasions required his assistance. He was, *naturally*, of a warm temper; which his general conduct or appearance, did not indicate. This shewed itself in smaller vexations, suddenly occurring; but rarely (though it appeared sometimes) in great matters. I have considered his victory over his natural temperament, as one of the greatest he had obtained. I have witnessed conquests of this kind, which have excited my most unqualified admiration; and yet it has been thought, that he was cold; and without keen feelings or sensibility. I heard a respectable foreigner assert (and, no doubt, he carried the idea to his own country) that diplomatic and other strangers, were not treated by the President with easy and *gracious* receptions. He added, that he never saw rudeness, but the politeness was cold; and seemed to be unintentional, and owing to the natural temperament of *the man*. All the reply I made, was, that I had not *generally* perceived this. I knew (or at least I thought; as I did in several other cases) that, *at that period*, the demeanor was exactly proper, in the instance cited; though I do not pretend to nice judgment in such matters. General character is often drawn from particular instances, hastily, or uncandidly. He knew well, that it was due to his station and himself, always to behave decorously; or, as it is commonly expressed,

like a gentleman. But I have ever considered it incompatible with the propensities of a candid mind, to practice the hypocrisy and insincerity of politeness, by affecting emotions not felt. What is called *graciousness*, if it be indiscriminately exercised, justifies (in my view of it) this remark. The address of *a man of the world*, politely, but not (according to his expectations) *graciously* received, would induce him to attribute it to general coldness of character; lest it should appear, that there was something particular in *his* case.

In his family he was beloved. His affectionate attentions to one of the worthiest and best of women, were always conspicuous; and tenderly and constantly reciprocated by her. He *would* be obeyed, but his servants were devoted to him; and especially those more immediately about his person. The survivors of them still venerate and adore his memory.*

The world are in possession of the facts, on which his PUBLIC CHARACTER is established. Whatever opinions may be formed as to his having been *a great man*, (of which I never doubted, though I enter into no discussions on this subject) those who enjoyed his friendship, and intimate acquaintance, must all agree, that a *better man* could not be found. If *history* should deem herself too elevated, to record

* His old and much valued servant *William* (a man of colour, once a slave, and known through the army; and by all who were acquainted in the General's family) still lives at *Mount Vernon;* where he is kindly and tenderly treated by its present proprietor, Judge *Washington*. He is much of a cripple; being afflicted with the rheumatism; the consequence of his campaigns with his master. His frequent *pilgrimage* is performed to his master's tomb, on his sticks or crutches. A gentleman a few months ago, had the curiosity to talk with William; who is intelligent and not disinclined to conversation, though not forward in loquacity. He treats the affairs of the world as matters in which he has now little concern, except as a *looker-on*. He observed—"And so I hear they talk of going to war.—What! go to war, now my old master is dead! No, no,—that wont do; let them wait, before they go to war, 'till they get such another. But they will first have a long—long—peace indeed:—and so much the better. They would not like war, if they knew as much about it as *we did*."

To another visitant at Mount Vernon—he was relating war occurrences. He stopped in his narrative—"Now we come to what passed in a way, that my master never thought I should speak of it:—so I always skip such things."

Much *honour*, it is true, cannot be derived from the eulogies of such men. But it is an evidence of the kind treatment his servants received, when their gratitude is thus strongly, and disinterestedly, expressed.

all these traits of character, they are nevertheless useful; and contribute to forming a correct estimate, and just opinion.

If I have taken an occasion, and place, deemed not necessarily to require it, to say what (chiefly) I personally know; and have had peculiar opportunities of understanding from the most respectable sources; and to pay my humble tribute to his memory (when patronage and power are gone;—and when the influence of his name does not continue, every where, to operate as it merits) it must not be ascribed to any vain presumption in me, that I can add to his character or fame. I have yielded to the irresistible impulses (unpremeditatedly excited in my search for this specimen of his writing) of a long and sincere affection and veneration; which will never cease, while life and recollection remain.

What he alludes to in his note (as it respects the committee of Congress) was his great plan of engrafting the subject of AGRICULTURE, into a national system of education; and placing the cultivators of the soil, and their instruction and excitements to improvement in their art, under national patronage. He was anxiously solicitous in this patriotic endeavour. It was not imputable to him that it failed. Had he been fortunate enough to accomplish it, no action of his life would have deserved more celebrity, and public gratitude.

RICHARD PETERS.

New Year's Day, 1811.

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ERRATA.

Errors in *orthography*, *grammar*, and *punctuation*, deficient or redundant, must be left for correction, to the candid and intelligent reader.

Memoirs, Page 2, 11 line from top read "never found to be injurious."
42, 2 paragraph, insert *a*, before *quarter or half an ounce &c.*
55, last paragraph, *for "rotted."* read *rolled.*
63, last paragraph should read (5 line from bottom,) "from thirty to fifty bushels of wheat, *per acre.*"
66, near the bottom—*chaff-bearing*, between culmiferous and crops—should be in a parenthesis.
73, line 6, of note—insert *yet*, before "we are assuredly."
91, 1, second paragraph—proprietor.
101, 5, second paragraph, dele *As*—before I.
119, 4, note, 2 paragraph dele "*dared*"—insert, *offered.*
7 line—indispensably.
145, 9, of note—"two *and* an half."
151, 3, dele "De."
173, Text 3 line, from the bottom; dele "*pounds*," and insert *bushels.*
220, last line. Read, "swine have *the mouth of* the duct, &c."
229, *for* "*most* sheep have, more or less, the lap-ear," read, *many* sheep, &c.
239, at the end—June 7th, should be *July* 7th.
246, *for* flock's, read *flocks.*
352, for caniscens, read canescens.
ii, Proofs of originality &c. The י Jod or Yod, is omitted in the word *Aliah*, or *Alieh*—*read*, אליה. *Magnus-fieri*—to be made, or formed, large.
ii, *read*, οσφύν, ΟΣΦΥΣ is *Lumbus, the loin. Osphun* means a continuation of the *loin.*
κερκοσ—kerkos, is *cauda*,—the *tail.* ὀρά, oura, is also *cauda*; from ὄρσσ, terminus, *the extremity.* It would apply to the appendage, below the οσφύν.—See the plate.
iv, part of the sixth line should read—"The flesh, *and the fat intermixed*, of all victims &c."
v, "flows back, to recruit the mass of blood and other parts of the system."—This should read, "*to recruit the mass of blood:*" ["and, consequently, other parts of the system."] The latter is an observation of the translator.

Inquiries on Plaister, page 18. For "respectfully" read respectively.
120, for "*of* aromatic pain" read, *in* aromatic pain.
Advertisement, before Inquiries: for *sat*, read *set.*

End of Volume